VOL. XXXI. CLEVELAND, O., FEBRUARY 9, 1905. No. 6.

Ship Building on the Lakes

The accompanying table of vessels under construction on the great lakes is especially illuminating as it shows the great strides that have been made in the past year in the size of ships. The year opened very inauspiciously indeed for in the early spring the ship yards of the great lakes found themselves practically without a single order on their books. This was in wonderful contrast to the year preceding when the ship yards of the great lakes had orders for sixty-two vessels, valued at over $13,000,000. It is significant to note that in the list of that year there were forty-eight freighters capable of carrying in a single trip 230,950 gross tons of ore. The summer of 1904 wore away without anything special in sight for the ship yards, but towards the latter part of it orders began to come in rapidly and before winter set in every ship yard on the lakes had all that it could possibly attend to. Considering all classes there are forty-seven ships now building on the lakes of which twenty-two are bulk cargo carriers, and three are package freighters. The singular and significant thing is that these twenty-five freighters have a carrying capacity on a single trip of 226,700 tons, thereby nearly equaling the carrying capacity of the forty-eight ships which were building less than two years ago. Subtracting the three package freighters with a carrying capacity on a single trip of 12,500 tons, leaves 214,200 tons as the carrying capacity of the twenty-two bulk freighters on a single trip. It is therefore apparent that the average carrying capacity of the ship today is once again as great as that of the ship built even as late as two years ago. Confined to the ore trade these new freighters would be able to move in a single season approximately 4,500,000 tons of ore. This, however, will not be their actual capacity for the coming season because some of them will not go into commission until the season is well advanced. It will be noted from the accompanying table that this new work is well distributed and that every ship yard on the lakes has a portion of it.

In addition the repair work under way is unusually extensive. As an instance of this, seven freighters are being lengthened 72 ft. each, six of them by the American Ship Building Co., and one by the Craig Ship Building Co. at Toledo. One of these ships which is now undergoing lengthening was launched only three years ago, proving the alacrity with which the owner can recognize the changed condition and his willingness to meet it. The ships are all being lengthened to increase their carrying capacity in order to lessen the disproportion which exists between them and the giant carriers now being built. The length of 72 ft. was decided upon because it was a multiple of the hatch spacing, providing three additional hatches, increasing the carrying capacity about 1,500 tons, and not affecting in any manner the stability of the ship.

One feature, far reaching in its importance, is the determination of the Steel Corporation to modernize its fleet and to scrap its smaller carriers. To this end it has already disposed of all of its whalebacks that can pass through the Canadian canals, or sixteen in all. The removal of these vessels from its existing fleet reducing the number from 112 to ninety-six sensibly increases the average cargo capacity of the remaining numbers of the fleet. The Steel Corporation would not start to do a thing without finishing it and as it has already given orders for four vessels, exceeding in dimensions anything now on the lakes, it may be expected to follow in due season with similar orders; and as it has disposed of a fair number of its smaller craft it can be depended upon to dispose of others as opportunity affords.

The present year, indeed, marks almost an epoch

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in ship building on the lakes. Accepted types have radically been departed from and a perusal of the pages of this issue will show that lake ship builders are exhibiting great boldness in design.

In its last ship building issue the Review stated that the Columbia Iron Works, St. Clair, Mich., had ceased its existence as a going concern. This plant has since been leased by the Great Lakes Engineering Works of Detroit which is now constructing the two Gilchrist freighters that were begun by the Columbia Iron Works.

An important movement of the past few weeks also has been the organization of the Port Huron Ship Building Co. which is a consolidation of the Jenks Ship Building Co. and the Dunford Dry Dock Co. The plant of this new company will, when completed, have capacity not only to build but to dock the longest and the widest ships on the lakes. The company is looking ahead to the accommodation of ships of greater beam than those now in commission on the lakes.

Vessels under Construction on the Great Lakes.

AMERICAN SHIP BUILDING CO.'S YARDS

To be built at	Type and name	Dimensions in Feet: Over all	Keel	Beam	Depth	Dimensions of Engines	Boilers, dimensions in feet and inches	Draft	Steam pressure Pounds	Capacity Gr ss tons	For whom building
Lorain	Frgt Ball Bros	500	480	52	30	22½, 36, 60-42	Two Scotch 13.9 x 11.6	Ellis & Eaves	180	8,000	G. A. Tomlinson, Duluth
Lorain	Frgt. J. C. Wallace	552	532	56	31	18½, 28½, 43½, 66-42	Two Babcock & Wilcox	Assisted	250	10,000	Acme Steamship Co., Duluth
Lorain	Frgt. S. M. Clement	500	480	52	30	22½, 36, 60-42	Two Scotch 13.9 x 11.6	Ellis & Eaves	180	8,000	B. & S. Steamship Co., Buffalo
Lorain	Frgt. Philip Minch	500	480	52	30	22½, 36, 60-42	Two Scotch 13.9 x 11.6	Ellis & Eaves	180	8,000	H. Steinbrenner, Cleveland
Wyandotte	Frgt. Amasa Stone	545	525	55	31	23½, 38, 63-42	Two Scotch 14.6 x 11.6	Ellis & Eaves	180	10,000	Samuel Mather, Cleveland
Wyandotte	Frgt. L. C. Smith	545	525	55	31	23½, 38, 63-42	Two Scotch 14.6 x 11.6	Ellis & Eaves	180	10,000	U. S. Trans. Co., Syracuse
Cleveland	Pck. F., Juniata	361	340	45	28	22, 31½, 45, 65-42	Four Scotch 12.6 x 11.6	Howden	210	3,500	Anchor Line, Buffalo
Cleveland	Frgt. F. L. Robbins	400	380	50	28	19, 30, 52-40	Two Scotch 12 x 12	Natural	170	6,000	W. H. Becker, Cleveland
West Bay City	Frgt. Sylvania	524	504	54	30	22½, 36, 60-42	Two Scotch 13.9 x 11.6	Ellis & Eaves	180	9,000	Duluth S. S. Co., Duluth
West Bay City	Frgt. Socapa	524	504	54	30	22½, 36, 60-42	Two Scotch 13.9 x 11.6	Ellis & Eaves	180	9,000	Superior S. S. Co., Duluth
Lorain	Frgt W. A. Rogers	545	525	55	31	23½, 38, 63-42	Two Scotch 14.6 x 11.6	Ellis & Eaves	180	10,000	Niagara Tran. Co., N. Tona'da
Cleveland	Frgt. L. C. Hanna	524	504	54	30	23½, 38, 63-42	Two Scotch 14.6 x 11.6	Ellis & Eaves	180	9,000	Mahoning S. S. Co., Cleveland
Detroit	Frgt P. Stackhouse	524	504	54	30	23½, 38, 63-42	Two Scotch 14.6 x 11.6	Ellis & Eaves	180	9,000	Mahoning S. S. Co., Cleve and
Cleveland	Frgt. unnamed	500	480	52	30	22½, 36, 60-42	Two Scotch 13.9 x 11.6	Ellis & Eaves	180	8,000	C. L. Hutchinson, Cleveland
Chicago	Frgt. E. H. Gary	569	549	56	31	24, 39, 65-42	Two Scotch 15.4½ x 11.6	Ellis & Eaves	170	10,000	Pittsburg S. S. Co., Cleveland
Chicago	Frgt. W. E. Cory	569	549	56	31	24, 39, 65-42	Two Scotch 15.4½ x 11.6	Ellis & Eaves	170	10,000	Pittsburg S. S. Co., Cleveland
West Superior	Frgt. G. W. Perkins	569	549	56	31	24, 39, 65-42	Two Scotch 15.4½ x 11.6	Ellis & Eaves	170	10,000	Pittsburg S. S. Co., Cleveland
West Bay City	Frgt. H. C. Frick	569	549	56	31	24, 39, 65-42	Two Scotch 15.4½ x 11.6	Ellis & Eaves	170	10,000	Pittsburg S. S. Co., Cleveland
Cleveland	Tug	95	85	21	12	20, 40-30	One fire box 11 x 14	Natural	125		Kelley Id. L. & T. Co. Cleveland
Buffalo	Scow		180	36	15		Dnky. blr. 48 in. x 6½ ft				Kelley Id. L. & T. Co. Cleveland
Buffalo	Scow		180	36	15		Dnky. blr. 48 in x 6½ ft				Kelley Id. L. & T. Co. Cleveland

GREAT LAKES ENGINEERING WORKS, DETROIT, MICH.

Detroit	Frgt. J. E. Davidson	524	504	54	30	18, 27, 40, 62-42	Two Niclausse water-tube, 13 x 9	Induced	250	9,000	Inter Ocean St'm'p Co., Duluth
Detroit	Frgt. unnamed	524	504	54	30	18, 27, 40, 62-42	Two Niclausse water-tube, 13 x 9	Induced	250	9,000	Zenith Steamship Co., Duluth
Detroit	Pck Frgt. Superior	408	388	50	30	21, 30, 43½, 63-42	Two Scotch 14.9 x 12	Forced	240	6,000	Western Transit Co., Buffalo
Detroit	F. Str. W. G. Mather	531	511	60	31	25, 39, 66-42	Two Scotch 15.6 x 12	Induced	175	10,000	Cleveland Cliffs Iron Co., Cl'v'd
Detroit	F. Str. Peter White	524	504	54	30	23, 38, 63-42	Two Scotch 14.9 x 12	Induced	175	9,000	Presque Isle Trans. Co., Cl'v'd
Detroit	Pck. Frgt. Delaware	370	350	50	30	19, 27, 40, 58-42	Two Scotch 13.9 x 11.6	Forced	210	5,000	Erie & West. Trans. Co., Buffalo
St. Clair	Frgt. unnamed	464	444	50	28	22, 36, 60-40	Two Scotch 13 x 11.6.	Induced	175	7,600	Gilchrist Trans. Co., Cleveland
St. Clair	Frgt. unnamed	464	444	50	28	22, 36, 60-40	Two Scotch 13 x 11.6.	Induced	175	7,600	Gilchrist Trans. Co., Cleveland
Detroit	Steel Float'g Dock	430		110	30	Mach'y elec'y driven				Lifting cap'y 4,000 gr tons	Great Lakes Engineering Works Detroit
Detroit	Drill Scow	100		30	6	Special	Special				Dunbar & Sullivan Co., Buffalo

CRAIG SHIP BUILDING CO., TOLEDO.

Toledo	Steel tug	65				14 x 16 high pressure	Fire box Boiler				For Toledo parties
Toledo	Steel sand sucker	130				13, 26 x 18	Fire box Boiler				For Toledo parties
Toledo	Lighthouse tender, Aspen	125				Compound					Lighthouse Board
Toledo	Frgt. Jas. P. Walsh	500	480	52	30	22½, 36, 60-42	Two Scotch, 13.9 x 11.6			8,600	C. O. Jenkins, Cleveland
Toledo	Steel Tug	75				12, 24 x 16	Water-tube				Govern't Eng. St. Mary's R'v'r

MANITOWOC DRY DOCK CO., MANITOWOC, WIS

Manitowoc	Steel tug	65	58	17	8½	16 x 18	One Scotch, 7 x 10	Natural	125		Chesbrough Bros.
Manitowoc	Pass. stmr.	141	130	28	10½	14, 22, 36-24	One Scotch, 12 x 12	Natural	175		Escanaba & Gladst'ne Tran. Co.
Manitowoc	Steel dredge	116		40	13						Edwards Bros., Sault Ste. Marie, Mich.

JOHNSTON BROS., FERRYSBURG MICH.

Ferrysburg	Tug	80				Steeple compound	One Scotch boiler				A. Tessler & Sons, Milwaukee
Ferrysburg	Tug	141				Fore and aft comp	One Scotch boiler				F. Perry, Sault Ste. Marie, Mich.
Ferrysburg		75				No machinery					United States Light House Dept.

BERTRAM ENGINE WORKS CO., TORONTO, ONT.

Toronto	Tug	95	86	19	10	14, 28-20	One 10 x 12	Natural	160		Keewatin Lumbering & Mfg. Co., Keewater, Ont.
Toronto	Dredge	90	90	36	9						Dominion Government
Toronto	Steamer	130				Com. twin-screw	Two Scotch				Not yet announced
Toronto	Tug	100				Compound	One Scotch				Not yet announced

POLSON IRON WORKS, TORONTO, ONT.

Toronto	Suction dredge	127	125	32	9 8	14, 22, 36-21	Two Scotch, 12 x 12.6	Natural	160		Dept. Pub. Wks., Dom. Govt.

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Naval Vessels Under Construction

The naval program of the United States, as far as numbers are concerned, stands precisely as it did one year ago, but as some of the ships which have gone into commission during the year have been replaced by orders for heavier ones, an increase is to be noted in displacement, horse power and value. Thirty-eight ships are now building for the United States navy of which thirteen are battleships, ten are armored cruisers, five protected cruisers, two gun boats, two training ships, one training brig, and five torpedo boats, representing a displacement of 379,865 tons, horse power of 534,600 tons and a value of $98,-078,466. These figures compare with 354,214 tons displacement, 404,100 horse power and $88,284,514, for the preceding year. The additions to the list since a year ago is the battleship New Hampshire building by the New York Ship Building Co., Camden, N. J., and the armored cruisers North Carolina and Montana, building by the Newport News Ship Building & Dry Dock Co., Newport News, Va. There should be added to the list also five submarines for which contract has just been awarded to the Holland Submarine Torpedo Boat Co. by the navy department. These submarines will be built by the Fore River Ship Building Co., Quincy, Mass. One is to be 105 ft. long and to cost $250,000, one 81 ft. to cost $200,000 and two 81 ft. to cost $185,000 each. This brings the naval building program up to nearly $100,000,000. Congress will probably authorize also at its present session the construction of two additional battleships. During the year the battleship Ohio went into commission. No other naval vessel went into commission during 1904 though some of the battleships and armored cruisers are practically structurally complete.

In merchant work on the sea-board there is nothing to report. On the contrary it is especially disheartening as there is not a single new order of any importance to chronicle. There is not now, nor has there been for the past three years, an order given for a vessel for the foreign trade of the United States. Orders were given for five vessels for the foreign trade a little more than four years ago when it was believed that congress would recognize the handicap under which shipping in this trade operates and relieve it by legislation. This, however, has not been accomplished and the orders were, therefore, not repeated. In the summary of merchant work in the succeeding column it will be noted that whatever has been done in a ship building way on the coast is for the coastwise trade and consists principally of wooden vessels. A glance at the column is all that is necessary to show how ignoble is the position that the United States occupies in the world's output of ships. The vessels of the great lakes, touched upon elsewhere, are not to be considered as they are built for a special trade.

Vessels under Construction for the United States Navy.

Name.	By whom and where building.	Contract date of completion.	Dimensions, ft., in. Normal condition. Length between perpendiculars	Breadth on L. W. L.	Mean draught.	Displacement, (normal).	I. H. P. (estimated).	Speed, knots (estimated).	Type of engine.	Type of boilers.	Contract price of hull and machinery.
Battleships.											
Nebraska	Moran Bros. Co., Seattle, Wash..	Mar. 7, 1906	435	76 2½	23 9	14,948	19,000	19	Trip. exp., twin-screw	Bab. & Wil	$ 3,733,600
Virginia	Newport News Co., Newport News	Feb. 15, 1906	435	76 2½	23 9	14,948	19,000	19	Trip. exp., twin-screw	Niclausse	3,590,000
Georgia	Bath Iron Works, Bath, Me	Feb. 18, 1906	435	76 2½	23 9	14,948	19,000	19	Trip. exp., twin-screw	Niclausse	3,590,000
New Jersey	Fore River Co., Quincy, Mass	Feb. 15, 1906	435	76 2½	23 9	14,948	19,000	19	Trip. exp., twin-screw	Bab. & Wil	3,105,000
Rhode Island	Fore River Co., Quincy, Mass	Feb. 15, 1906	435	76 2½	23 9	14,948	19,000	19	Trip. exp., twin-screw	Bab. & Wil	3,105,000
Connecticut	Navy Yard, New York	Mar. 15, 1906	450	76 10	24 6	16,000	16,500	18	Trip. exp., twin screw	Bab. & Wil	4,212,000
Louisiana	Newport News Co., Newport News	Mar. 15, 1906	450	76 10	24 6	16,000	16,500	18	Trip. exp., twin-screw	Bab. & Wil	3,990,000
Vermont	Fore River Co., Quincy, Mass	Dec. 20, 1906	450	76 10	24 6	16,000	16,500	18	Trip. exp., twin-screw	Bab. & Wil	4,179,000
Kansas	New York S. B. Co., Camden, N.J.	Dec. 16, 1906	450	76 10	24 6	16,000	16,500	18	Trip. exp., twin-screw	Bab. & Wil	4,165,000
Minnesota	Newport News Co., Newport News	Dec. 20, 1906	450	76 10	24 6	16,000	16,500	18	Trip. exp., twin-screw	Bab. & Wil	4,110,000
Mississippi	Cramp & Sons, Philadelphia	Mar. 25, 1907	375	77	24 8	13,000	10,000	17	Trip. exp., twin-screw	Bab. & Wil	2,999,500
Idaho	Cramp & Sons, Philadelphia	May 25, 1907	375	77	24 8	13,000	10,000	17	Trip. exp., twin-screw	Bab. & Wil	2,999,500
New Hampshire	New York S. B. Co., Camden, N.J.	Feb. .. 1908	450	76 10	24 6	16,000	16,500	18	Trip. exp., twin-screw	Water-tube	3,748,000
Armored Cruisers.											
Pennsylvania	Cramp & Sons, Philadelphia	Jan. 10, 1904	502	69 6½	24 1	13,780	23,000	22	Trip. exp., twin-screw	Niclausse	3,890,000
Colorado	Cramp & Sons, Philadelphia	Jan. 10 1904	502	69 6½	24 1	13,780	23,000	22	Trip. exp., twin-screw	Niclausse	3,780,000
California	Union Iron Works, San Francisco	Jan. 10, 1904	502	69 6½	24 1	13,680	23,000	22	Trip. exp., twin-screw	Bab. & Wil	3,800,000
South Dakota	Union Iron Works, San Francisco	Jan. 10, 1904	502	69 6½	24 1	13,680	23,000	22	Trip. exp., twin-screw	Bab. & Wil	3,750,000
West Virginia	Newport News Co., Newport News	Jan. 24, 1904	502	69 6½	24 1	13,680	23,000	22	Trip. exp., twin-screw	Bab. & Wil	3,885,000
Maryland	Newport News Co., Newport News	Jan. 24, 1904	502	69 6½	24 1	13,680	23,000	22	Trip. exp., twin-screw	Bab. & Wil	3,775,000
Tennessee	Cramp & Sons, Philadelphia	Aug. 9, 1906	502	72 10½	25	14,500	23,000	22	Trip. exp., twin-screw	Bab. & Wil	4,035,000
Washington	New York S. B. Co., Camden, N.J.	Aug. 10, 1906	502	72 10½	25	14,500	23,000	22	Trip. exp., twin-screw	Bab. & Wil	4,035,000
North Carolina	Newport News Co., Newport News	Jan. .. 1908	502	72 10½	25	14,500	23,000	22	Trip. exp., twin-screw	Water-tube	3,575,000
Montana	Newport News Co. Newport News	Jan. .. 1908	502	72 10½	25	14,500	23,000	22	Trip. exp., twin-screw	Water-tube	3,575,000
Protected Cruisers.											
St. Louis	Neafie & Levy, Philadelphia	Mar. 11 1904	424	66	22 6	9,700	21,000	22	Trip. exp., twin-screw	Bab. & Wil	2,740,000
Milwaukee	Union Iron Works, San Francisco	Apr. 17 1904	424	66	22 6	9,700	21,000	22	Trip. exp., twin-screw	Bab. & Wil	2,825,000
Charleston	Newport News Co., Newport News	Mar. 30, 1904	424	66	22 6	9,700	21,000	22	Trip. exp., twin-screw	Bab. & Wil	2,740,000
Galveston	Norfolk Navy Yard, Norfolk, Va..	June 14, 1902	292	44	15 9	3,200	4,700	16 5	Trip. exp., twin-screw	Bab. & Wil	1,027,000
Chattanooga	Navy Yard, New York, N.Y.	June 14, 1902	292	44	15 9	3,200	4,700	16 5	Trip. exp., twin-screw	Bab. & Wil	1,039,966
Gunboats											
Dubuque	(Gas Engine & Power Co.)	Nov 29, 1904	174	35	12 3	1,085	1,000	12	Trip. exp., twin-screw	Bab. & Wil	295,000
Paducah	(Chas. L. Seabury & Co.) Morris Heights, N.Y.	Mar. 6 1905	174	35	12 3	1,085	1,000	12	Trip. exp., twin-screw	Bab. & Wil	355,000
Steel Training Ships.											
Cumberland	Navy Yard, Boston	.....	176 5	45 7¾	16 5¼	1,800	.....	.....	Sail power	.....	370,000
Intrepid	Navy Yard, Mare Island	.....	176 5	45 7¾	16 5¼	1,800	.....	.....	Sail power	.....	370,000
Wooden Tr'ning Brig											
Boxer	Navy Yard, Portsmouth, N.H.	.....	108	29 11	9 2½	346	.....	.....	Sail power	.....	50,000
Torpedo Craft.											
Goldsborough	Navy Yard, Puget Sound	Jan 30, 1899	198	20 7¾	6 10½	255	6,000	30	Trip. exp., twin-screw	Thorneycroft	214,500
Stringham	Navy Yard, League Island	Jan 29 1899	225	22	6 6	310	7,200	30	Trip. exp., twin-screw	Thorneycroft	236,000
Blakely	Lawley & Sons, S. Boston, Mass.	Sept. 27 1899	175 11½	17 8¾	5 10¾	196	3,000	26	Trip. exp. twin screw	Thorneycroft	159,400
Nicholson	Navy Yard, New York	Sept 26, 1899	175	17	6 5½	218	.....	25 7	Trip. exp., twin-screw	Mosher	165,000
O'Brien	Navy Yard, New York	Sept 26, 1899	175	17	6 5¾	220	.....	25	Trip. exp., twin screw	Mosher	165,000
						379,865	534,600				$98,978,466

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Merchant Work in Coast Ship Yards

Newport News Ship Building & Dry Dock Co., Newport News, Va.:

Steam steel ferryboats Scranton, Elmira, Binghampton and Scandinavia, all duplicates, for the Hoboken Ferry Boat Co.; length 231 ft.; compound engines; two single-ended boilers; 1,400 H. P.; gross tonnage, 1,462.90.

Submarine torpedo boat Simon Lake X for Lake Torpedo Boat Co.; gasoline engine; 250 H. P.; gross tonnage 140.

Three additional submarine torpedo boats, duplicates of Simon Lake X, for Lake Torpedo Boat Co.

Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.:

Two steel freight steamers, duplicates, for East Caicos Steamship Co.; length 202 ft.; triple single screw engines; two Scotch boilers; 950 H. P.; gross tonnage 2,650.

Maryland Steel Co., Sparrow's Point, Md.:

Steel suction dredge for the Engineer's Department, U. S. Army; length 315 ft.; compound twin-screw engine; four Scotch boilers; 1,500 H. P.; gross tonnage 2,700.

Four steel ferry boats, duplicates, for the city of New York; length 250 ft.; two compound double-screw engines; four Babcock & Wilcox boilers; 3,400 H. P.; gross tonnage 1,500.

Fore River Ship Building Co., Quincy, Mass.:

Sidewheel passenger steamer Providence for the Fall River Line; length 379 ft.; double inclined compound paddle wheel engine; six Scotch boilers; 5,500 H. P.; gross tonnage 3,600; cost $1,000,000.

Four submarine torpedo boats for the Holland Submarine Torpedo Boat Co.—One 105 ft. long and three 81 ft. long.

Eastern Ship Building Co., New London, Conn.:

Steel passenger freight steamer Dakota for Great Northern Steamship Co. of Seattle, Wash.; length 630 ft.; triple-expansion twin screw engine; sixteen water-tube boilers; 10,000 H. P.; gross tonnage 21,000; cost $3,000,000.

Harlan & Hollingsworth Co., Wilmington, Del.:

Single screw freight and passenger steamer for the Old Bay Line, Baltimore, Md.; length 305 ft.; four cylinder triple-expansion engines, 24½, 40, 47, 47, 42 in.; four single-ended Scotch boilers; 3,000 H. P.; gross tonnage 2,300.

Single screw tug boat for Immigration Commission, New York; length 103 ft.; compound engines, 18, 36-24 in.; one single-ended boiler; 600 H. P.; gross tonnage 250.

Fire boat for the City of Washington, D. C.; length 93 ft.; single engine, 24-26 in.; two single-ended boilers; 350 H. P.; gross tonnage 225.

Oil barge for the Pure Oil Co., Marcus Hook; length 180 ft.

Dredge and snag boat for city of Charleston, N. C.; length 150 ft.

Caisson for dry dock for League Island navy yard; length 105 ft.

Double screw ferryboat for Erie Railroad, New York; length 224 ft.; double compound engine, 18, 38, 38, 18-28 in.; two single-ended boilers; 1,900 H. P.; gross tonnage 1,450.

Moran Bros. Co., Seattle, Wash.:

Reboilering, putting three Scotch marine boilers in steamship Ohio for Moran Bros. Co., Seattle, Wash.

Reboilering, putting four Scotch marine boilers into the steamer Santa Rosa for the Pacific Coast Steamship Co., San Francisco.

Reboilering, putting four Scotch marine boilers into steamer Spokane for the Pacific Coast Steamship Co.

E. & I. K. Stetson, Bangor, Me.:

Four-masted wooden schooner Augusta W. Snow for themselves; gross tons 750; cost $48,000.

Gas Engine & Power Co., and Chas. L. Seabury & Co., Consolidated, Morris Heights, New York:

Schooner-rig steam yacht, composite, for Alfred Marshall, Mamaroneck, N. Y.; length 131 ft.; triple, single-screw engine; one Seabury water-tube boiler; 500 H. P.; gross tonnage 100.

Wooden steam yacht for Brayton Ives, New York; length 120 ft.; triple, twin-screw engine; one Seabury water-tube boiler; 800 H. P.; gross tonnage 70.

Wooden steam yacht for J. A. Mollenhauer, Brooklyn, N. Y.; length 65 ft.; triple, single-screw engine; one Seabury water-tube boiler; 125 H. P.; gross tonnage 25.

Wooden gasoline yacht for A. G. Cooper, New York; length 47 ft.; two gasoline four cycle engine; 24 H. P.

Wooden gasoline yacht for F. D. Stout, Chicago, Ill.; length 50 ft.; gasoline four cycle engine; 48 H. P.

Wooden gasoline yacht for J. H. Oliphant, New York; length 65 ft.; two gasoline four cycle engines; 100 H. P.

Wooden gasoline yacht for H. L. Terrell, New York; length 60 ft.; two gasoline four cycle engines; 60 H. P.

Wooden gasoline yacht for R. J. Schaefer, New York; length 60 ft.; gasoline four cycle engine; 48 H. P.

Wooden gasoline yacht for Charles H. Fletcher, New York; length 75 ft.; two gasoline four cycle engines; 100 H. P.

Roach's Ship Yard, Chester, Pa.:

Steel tugboat for Old Dominion Steamship Co., New York; length 100 ft.; triple-expansion engine; one Scotch boiler.

Neafie & Levy Ship & Engine Building Co., Philadelphia, Pa.:

Harbor towboats Nos. 989, 990 and 991, duplicates, for Quartermaster's Department, U. S. A.; length 110 ft.; compound, single-screw engine; Scotch boiler; 450 H. P.; gross tonnage 250; cost $60,000.

Pusey & Jones Co., Wilmington, Del.:

Wooden hull, steam and sail, single-screw vessel Explorer for the U. S. Coast and Geodetic Survey; length 147 ft.; compound engine, 13 and 26 by 20 in. stroke; boiler of Scotch type, 10 ft. 6 in. diameter, 11 ft. long, with two Morison corrugated furnaces; 300 H. P.; gross tonnage 450.

Single screw, steel hull, steamer for Ordnance Department, U. S. Government; length 120 ft.; compound engine, 18 and 36 by 22 in. stroke; Babcock & Wilcox boiler, 150 lbs. pressure; gross tonnage 421.

Machinery for revenue cutter No. 14 for the Revenue Cutter Service; triple-expansion single-screw propelling engine, 20¾, 32 and 50 in. by 27 in. stroke; two single-ended boilers of the horizontal return fire-tube type, each 14 ft. 2⅜ in. outside diameter by 10 ft. 2 in. long over heads, each boiler to have three corrugated furnaces, 3 ft. 6 in. diameter.

John W. Dickie, San Francisco, Cal.:

Wooden steam ferryboat for San Francisco, Oakland & San Jose Ry. Co., Oakland, Cal.; length 200 ft.; quadruple engines, propeller each end; two Babcock & Wilcox boilers; 2,000 H. P.; gross tonnage 900; cost $150,000.

Merrill-Stevens Co., Jacksonville, Fla.:

Steel stern-wheel snag boat and dredge Florida for U. S. Engineer Corps; length 131 ft.; two engines, 15 by 66 in.; two boilers, 93 by 144 in.; gross tonnage 300; cost $80,000.

Steel side-wheel river passenger and freight steamer Swan for W. T. Gibson, Savannah, Ga.; length 156 ft.; two independent inclined paddlewheels, each with a 12-in. cylinder by 60 in. stroke; two boilers, 6 by 12 ft.; gross tonnage 281.

Rebuilding the steamer Rosa.

Greenport Basin & Construction Co., Greenport, Suffolk Co., N. Y.:

Steam suction dredges St. John and Caucus, duplicates, for the United States Government; length 200 ft.; compound condensing engine; two Scotch boilers; 1,200 H. P.; gross tonnage 1,400; cost $150,000.

Wm. McKie, 100 Border St., E. Boston, Mass.:

Ferryboat for Boston Ferry Co.; length 150 ft.; 500 H. P.; gross tonnage 400; cost $10,000.

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James Clark Co., Baltimore, Md.:

Tug boat; 115 ft. long; fore and aft compound surface condensing engine, 15 and 30 by 22 in. stroke; steel Scotch boiler.

George Lawley & Son Corporation, South Boston, Mass.:

Steel sail racing yacht for F. F. Brewster; length 125 ft.; cost $45,000.

Wooden naphtha launch Runaway; length 88 ft.; Buffalo twin-screw gasoline engine; cost $15,000.

Wooden schooner for B. C. Davis, Boston; length 65 ft.; cost $13,000.

Wooden naphtha launch for J. H. Proctor, Boston; length 61 ft.; Standard gasoline engine; cost $9,000.

Jackson & Sharp Co., Wilmington, Del.:

Dumping scow for Taylor Dredging Co., New York; length 125 ft.

Tank barge for Pennsylvania Salt Mfg. Co., Philadelphia; length 180 ft.

Four car floats, duplicates, for Philadelphia & Reading Ry. Co., Philadelphia; length 176 ft.

Joseph Supple, Portland, Ore.:

Two wooden gasoline launches, duplicates, for Warren Pkg. Co.; length 60 ft.; gasoline single screw engines; 35 H. P.; gross tonnage 20; cost $3,000.

Barge; 70 ft. long to cost $2,000.

W. A. Boole & Son, Oakland, Cal.:

Wooden schooner; length 106 ft.; gasoline single screw engine; gross tonnage 125; cost $30,000.

James Rees & Sons Co., Pittsburg, Pa.:

Have plans for a steel-hull wharf boat for Memphis, Tenn., 325 ft. long, 50 ft. beam, 6 ft. hold, having eighteen watertight compartments, corrugated iron cargo box, with iron truss roof.

Plans for Ohio River stern-wheel packet 230 ft. long, 38 ft. beam, 5½ ft. hold.

Plans for stern-wheel cotton boat 160 ft. long, 32 ft. beam and 3 ft. hold.

E. A. Crosby, Bath, Me.:

Four-masted schooner Mary L. Newhall for builder and others; gross tonnage 1,310; cost $75,000.

Four-masted schooner for builder and others; gross tonnage 1,500; cost $90,000.

Kelley Spear Co., Bath, Me.:

Four-masted schooner for R. R. Freeman, Boston, Mass.; length 182 ft.; gross tonnage 700; cost $45,000.

F. S. Bowker & Son, Phippsburg, Me.:

Three-masted wooden schooner Julia P. Cole for South Gardiner Lumber Co., South Gardiner, Me.; length 165 ft.; gross tonnage 495; cost $33,000.

Perris A. Colwell, wooden schooner, for Daniel J. Leary of Brooklyn, N. Y.; length 175 ft.; gross tonnage 516; cost $34,000.

King & Winge, Seattle, Wash.:

Rebuilding the wooden schooner Ruby A. Cousins for themselves; length 140 ft.; gross tonnage 192; cost $11,000.

United Engineering Works, San Francisco, Cal.:

Redondo; 80 ft. long; compound screw engine; one Scotch boiler, 150 lbs. power; 300 H. P.; cost $35,000.

W. Irving Adams, East Boothbay, Me.:

Wooden schooner yacht for C. E. Lewis Sons Co., Portland, Me.; length 51 ft.; gross tonnage 30; cost $4,000.

Schooner lobster smack for John G. Cox & Co., Boston, Mass.; length 51 ft.; gross tonnage 30; cost $400.

G. W. Rawley, Tenant's Harbor, Me.:

Side-wheel paddle steamer; length 150 ft.; simple beam engine; one boiler; gross tonnage 300; cost $30,000.

New York Ship Building Co., Camden, N. J.:

Lightship No. 81 for the U. S. Government; 113 ft. long; compound single-screw engine; 450 H. P.; gross tonnage 473; cost $90,000.

Lightship No. 78 for U. S. Government; length 113 ft.; compound single-screw engine; 450 H. P.; gross tonnage 473; cost $90,000.

Car-float No. 68 for Pennsylvania R. R.; length 332 ft.; gross tonnage 600; cost $90,000.

Car-float No. 69 for Pennsylvania R. R.; length 340 ft.; gross tonnage 650; cost $90,000.

Burlee Dry Dock Co., Port Richmond, S. I., N. Y.:

Steel Staten Island ferryboat for the Dept. of Docks and Ferries, New York; length 250 ft.; two compound engines, 22½ and 50 by 37 in. stroke; four Babcock & Wilcox boilers; 3,000 H. P.; gross tonnage 1,000.

Two wooden car-floats for the Delaware, Lackawanna & Western R. R., New York; length 250 ft.

Steel coal barge, 200 ft. long, of 1,000 gross tons capacity.

Arthur D. Story, Essex, Mass.:

Fishing schooner for themselves of 95 ft. length; cost $9,000.

Fishing schooner for H. Parkhurst & Son, Gloucester, Mass.; length 118 ft.; cost $1,200.

Fishing schooner for Wallace & Keeney, New York; length 100 ft.; cost $10,500.

Fishing schooner for Boston Maritime Co., Boston, Mass.; length 121 ft.; cost $13,500.

Oliver Gildersleeve & Sons, Gildersleeve, Conn.:

Four wooden coal barges, duplicates, for themselves; length 121 ft.; gross tonnage 365; cost $6,500.

Four wooden coal barges, duplicates, for themselves; length 105 ft.; gross tonnage 239; cost $5,000.

Three wooden deck scows, duplicates, for themselves; length 110 ft.; gross tonnage 287; cost $6,500.

Fulton Iron Works, Harbor View, San Francisco, Cal.:

Wooden lumber and passenger steamer Cascade for Charles R. McCormick & Co., San Francisco; length 172 ft.; triple-expansion engine; Babcock & Wilcox boiler; 475 H. P.; gross tonnage 475. Hull built by Bendixon Ship Building Co., Eureka, Cal.

Wooden lumber and passenger steamer Helen P. Drew for L. E. White Lumber Co., San Francisco, Cal.; length 140 ft.; compound engine; Scotch marine boiler; 250 H. P.; gross tonnage 260. Hull built by G. H. Hitchings, Hoquiem, Wash.

Duplex tandem compound engine for wooden stern wheel car ferry owned by Southern Pacific Co., 272 ft. long; 600 H. P.

Cobb, Butler & Co., Rockland, Me.:

Wooden four-masted schooner for Crowell & Thurlow of Boston, Mass.; length 259 ft.; gross tonnage 1,800.

Charles L. Rohde & Sons, Boston St., Baltimore, Md.:

Covered lighter for The Imperial Co., Norfolk, Va., 90 by 26 by 8½ ft.

Open lighter for Baltimore parties, 80 by 30 by 10 ft.

John A. Ryan, Southern Ship Building Co., Jacksonville, Fla.:

Three-masted schooner-rigged wooden barge for the Cook Cummer Steamship Line, Philadelphia, Pa.; length 192 ft.; gross tonnage 850; cost $90,000.

McIntyre & Henderson, Baltimore, Md.:

Tug boat for themselves; length 82 ft.; compound engine; leg type boiler, 125 lbs. pressure; 250 H. P.; gross tonnage 50; cost $1,800; wooden hull.

Baltimore Ship Building & Dry Dock Co., Baltimore, Md.:

Steam steel tug George F. Randolph for the Baltimore & Ohio R. R.; length 118 ft.; compound engine, 20, 40-28 ft.; 600 H. P.; gross tonnage 210; cost $65,000.

Rebuilding Edenton for Suffolk & Carolina Ry. Co.; length 125 ft.; twin-screw 10 by 10 and 10 by 10 engine; one boiler 8 ft. 6 in. by 9 ft. 6 in.

Railroad collier Harrisburg to be converted to barge for F. W. Uran, Philadelphia.

Ollinger & Bruce Dry Dock Co., Mobile, Ala.:

Wooden dredge for Home Dredging Co., Mobile, Ala.; length 60 ft.; cost $5,000.

Sawyer Bros., Milbridge, Me.:

Three-masted wooden vessel for Henry Loud and builders;

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length 150 ft.; Hyde windlass outfit; gross tonnage 400; cost $25,000.

Three-masted wooden vessel building for the market; length 175 ft.; gross tonnage 600; cost $35,000.

George K. Phillips & Co., Bethel, Del.:

Wooden vessel for Daniel J. Fooke and others, Laurel, Del.; length 160 ft.; gross tonnage 500; cost $32,000.

Greene Bros. Co., Bridgeport, Conn.:

Wooden oyster boat Janice Pettis for Robert Pettis, Providence, R. I.; length 45 ft.; Hitchcock gas engine, Bridgeport, Conn.; 40 H. P.; gross tonnage 13; cost $6,000.

Wooden oyster boat David R. Dodge for David R. Dodge, Long Meadow, R. I.; length 48 ft.; automatic gas engine, Automatic Machine Co., Grand Rapids, Mich.; 21 H. P.; gross tonnage 14; cost $6,000.

Wooden yacht for C. A. Mathison, Brooklyn, N. Y.; length 66 ft.; Wolverine gas engine, Grand Rapids, Mich.; 40 H. P.; cost $10,000.

Wooden oyster boat for R. W. Saw, Jr., New Haven, Conn.; length 55 ft.; Hitchcock gas engine, Bridgeport, Conn.; 40 H. P.; gross tonnage 14; cost $8,000.

Howard's Ship Yard Co., Jeffersonville, Ind.:

Stern-wheel steamer Kentucky for Tennessee River Packet Co.; length 200 ft.; high pressure 14 by 6 engine; gross tonnage 400; cost $25,000.

Stern-wheel steamer for Tennessee River Packet Co.; length 225 ft.; high pressure 16 by 7 engine; gross tonnage 800; cost $30,000.

Stern-wheel steamer Bowling Green for Green River Packet Co.; length 150 ft.; high pressure 14 by 6 engine; gross tonnage 400; cost $24,000.

Stern-wheel steamer Three States for the Cairo Ferry Co.; length 175 ft.; high pressure 14 by 6 engine; gross tonnage 300; cost $20,000.

Steel catamoran Baldwin for Union Ferry Co.; length 125 ft.; high pressure 13 by 5 engine; gross tonnage 300; cost $22,000.

Stern-wheel steamer Hart for Augustus Hart, St. Louis; length 145 ft.; high pressure 13 by 5 engine; gross tonnage 250; cost $20,000.

Evan Owen, Weems, Va.:

Gasoline dredge Dilliard for H. C. Glenn, Whealton, Va.; length 40 ft.; Watkins gasoline engine, two cylinder, four cycle; 15 H. P.; cost $2,500.

H. M. & R. L. Bean, Camden, Me.:

Five-masted wooden schooner for Capt. John G. Crowley, Coastwise Transportation Co., Taunton, Mass.; length 281 ft.; gross tonnage 2,500.

Washburn Bros., Thomaston, Me.:

Three-masted schooner Mary Bradford Pierce for themselves; length 142 ft.; gross tonnage 428; to be fitted with auxiliary machinery.

One additional schooner to be duplicate of the Pierce.

I. L. Snow & Co., Rockland, Me.:

Wooden schooner of 550 tons capacity for themselves.

Rebuilding the tugs Delta and Stella.

Tarr & James, Essex, Mass.:

Wooden fishing schooner of 100 tons capacity.

Charles Ward, Kennebunkport, Me.:

Two wooden barges, duplicates, for Piscataqua Navigation Co., Portsmouth, N. H.; length 100 ft.; gross tons 90.

Herreshoff Mfg. Co., Bristol, R. I.:

Twelve 30-ft.racing boats, duplicates, designed by Capt. Nat. Herreshoff for various members of the New York Yacht Club.

Thames Tow Boat Co., New London, Conn.:

Wooden barge John Forsyth for builders.

Wooden tug Miles Standish for builders; length 68 ft.; 16 by 15 in. engine; 9 by 7 ft. boiler.

Bayles & Son, Port Jefferson, N. Y.:

Wooden steamer for A. Bedell Benjamin, Stratford, Conn.; length 87 ft.; triple-expansion engine; water-tube boiler.

Jakobson & Peterson, South Brooklyn, N. Y.:

Eight wooden scows, duplicates, 100 ft. long.

J. S. Ellis & Son, Tottenville, N. Y.:

Wooden water-boat for Wm. Cunningham, 10 South street, New York; length 68 ft.; engine, 16 by 16 in.; boiler, 6.5 by 9.5 ft.; gross tonnage 80.

Wooden tug boat for Vierow's Towing Line, Pier 50, N. R., N. Y.; length 75 ft.

Gasoline propelled oyster boat for George Forrester, Prince Bay, S. I., N. Y.; length 45 ft.; 28 H. P.

Gasoline propelled oyster boat for George T. Androvette, Prince Bay, S. I., N. Y.; length 52 ft.; 35 H. P.

Raritan Dry Dock Co., Perth Amboy, N. J.:

Five wooden barges, duplicates; length 130 ft.; gross tonnage 1,000.

T. S. Marvel, Newburgh, N. Y.:

Steel, screw type, ferryboat for N. Y. Central & H. R. R. Co.; length 200 ft.; gross tonnage 1,300. Machinery building by W. & A. Fletcher Co., Hoboken, N. J.

Steel barge for Lackawanna R. R. of 2,000 tons capacity.

Three steel barges, duplicates, for Lackawanna R. R.; gross tonnage 2,000.

Wooden lighter for Newark Bay Short Line; length 125 ft.

Wm. E. Woodall & Co., Baltimore, Md.:

Wooden tug, 110 ft. long; fore and aft compound engine, 15-30 by 22 in.; one boiler, 150 lbs. pressure.

Wooden barge, 80 ft. long.

Wooden tug, 68 ft. long; engine, 16 by 18 in.; one leg boiler, 125 lbs. steam.

Wooden mud scow, 124 ft. long.

Thomas McCosker & Co., Baltimore, Md.:

Wooden tug for Phillip Weaver & Son, Baltimore, Md.; length 108 ft.; fore and aft compound engine, 12.5-25 by 20 in.; boiler, 11 by 10 ft.; gross tonnage 162.

George T. Dawson, Solomons, Md.:

Wooden barge for the P. Dougherty Co., Baltimore, Md.; length 160 ft.; gross tonnage 1,200.

Fogarty Bros., Bradentown, Fla.:

Wood stern-wheel steamer City of Venice for Sarasota Bay & Manatee River Transportation Co., Sarasota, Fla.

A. J. Rains, Guntersville, Ala.:

Wooden car float Nashville, Chattanooga & St. Louis Ry.; length 215 ft.; capacity, ten railroad cars.

Elizabeth Marine Way, Elizabeth, Pa.:

Four wooden mud scows, duplicates, for U. S. Engineer Department, Louisville, Ky.; length 85 ft.; capacity 300 cu. yds.

B. A. Gnagi, Osage City, Mo.:

Wooden ferryboat Minnie for J. D. Thomas, Waverly, Mo.; length 71 ft.; two engines 6 by 24 in.; one fire-box boiler, 30 in. by 10 ft.; gross tonnage 34.

Wooden barge for Buck-Elk Steamboat Co., Hermann, Mo.; length 65 ft.; gross tons 45.

Rebuilding steamer Buck Elk for Buck Elk Steamboat Co.; length 100 ft.; two engines, 7 by 42 in.; one Scotch marine boiler, 42 by 12 in.; gross tonnage 58.

Bendixsen Ship Yard, Eureka, Cal.:

Wooden coasting steamer Wasp for Fred. Linderman, 18 California street, San Francisco, Cal.; length 177.5 feet.; one vertical inverted triple-expansion engine, 12, 19, and 32 by 24 in., built by United Engineering Works, San Francisco; one Babcock & Wilcox marine water-tube boiler; gross tons 800.

George H. Hitchings, Hoquiam, Wash.:

Wooden tug Redondo for R. R. Thompson, Redondo, Cal.; length 85 ft.; fore and aft compound engine; one boiler 9 by 10 ft.

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Wooden railroad float Kalama for Northern Pacific R. R. Co.; length 270 ft.; gross tons 1,201.

Lindstrom Ship Building Co., Aberdeen, Wash.:

Wooden tug Daring for Grays Harbor Tugboat Co., Grays Harbor, Wash.; length 115 ft.; 750 H. P.; gross tonnage 200.

Wooden steam schooner Sea Foam for Beadle Bros., San Francisco, Cal.; length 126 ft.; 700 H. P.; gross tonnage 339.

George E. Cottrell, Lakeside, Wash.:

Twin-screw passenger steamer City of Chelan, 120 ft. long; compound engine.

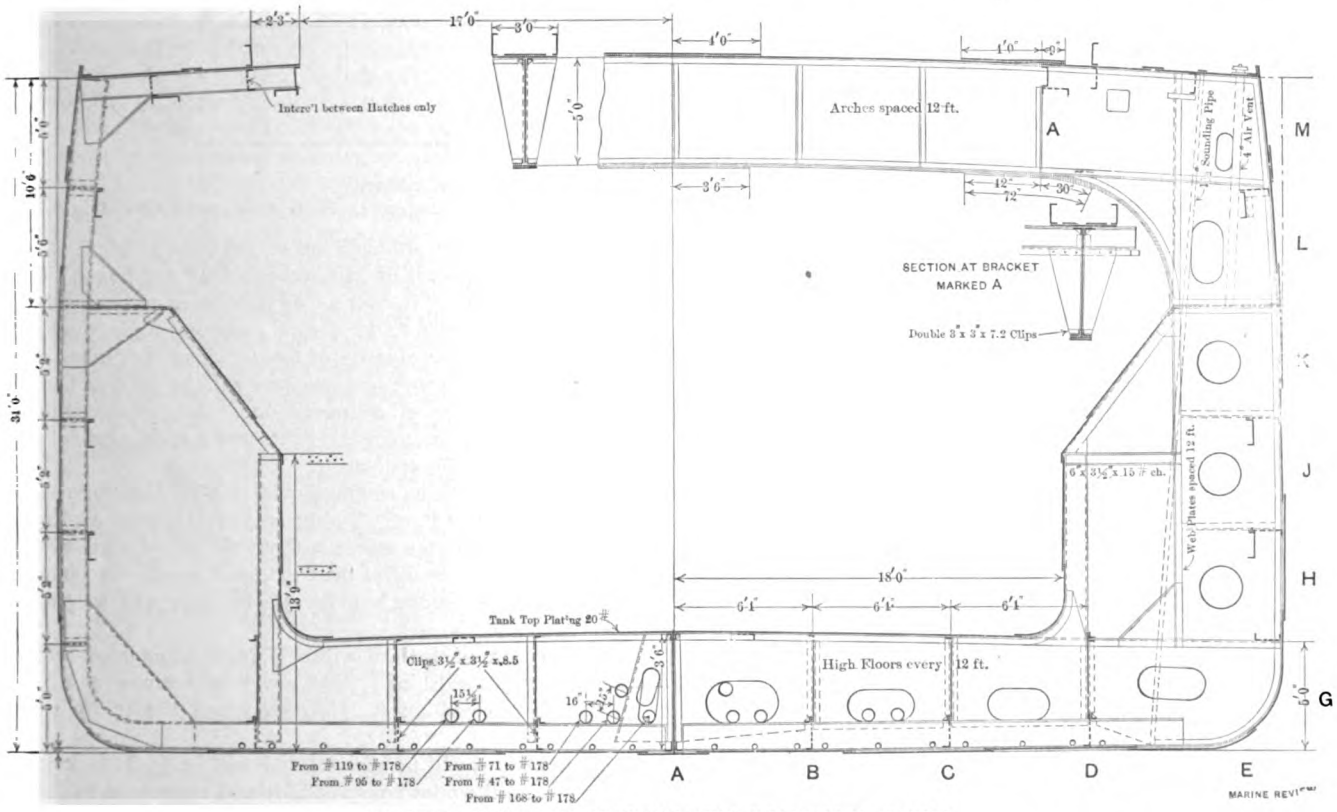
Portland Ship Building Co., Portland, Ore.:

Wooden vessel Arago for U. S. Engineer Department. Machinery is building by Williamette Iron Works, Portland, Ore.

Three gasoline launches and numerous smaller craft.

Steel Corporation's New Steamers

Since the Pittsburg Steamship Co. through Mr. Harry Coulby, its president and general manager, placed orders with the American Ship Building Co. for the construction of four steamers to exceed in dimensions anything at present on the lakes, it has sold all of its whalebacks that are of Canadian canal dimensions, sixteen in number. The four steamers now building have a capacity to move ore considerably in excess of the sixteen vessels that have been disposed of, showing how greatly has been the advance in the size of the average cargo during the past few years. These new ships, however, will not be ready to go into commission at the opening of navigation, so that the corporation's ore carrying capacity may be said to be practically the same as it was last year. Undoubtedly it is the intention, however, of the corporation to completely modernize its fleet so that more orders for great ships may be expected from it in due season. These new ships offer further testimony to the originality of design now marking the evolution of ship building on the lakes. They are in a number of features unlike any ships built or building. In the first place they are the longest on the lakes, being 9 ft. longer than the steamer Augustus B. Wolvin or 569 ft. over all, 549 ft. keel, 56 ft. beam and 31 ft. deep. While the general principle of construction is the same as their predecessors in the absence of stanchions and stringers or any interference below deck with the unloading machines, the vessels are not of arch construction. Mr. Coulby, after consulting a number of authorities, concluded that an arch was primarily intended to support weight from the top and that a more rigid longitudinal construction could be secured by a straight girder across the deck. The construction of the cargo hold also is a departure from anything at present on the lakes. It might be said to be a compromise between the Wolvin and the later Tomlinson boats. The cargo hold descends in a straight line from the deck until within 9 ft. of the tank top when an inner hold or hopper is constructed 9 ft. from the skin of the ship and descending to the tank top. The top of the hopper is joined to the skin of the ship by an incline construction, thus avoiding what would otherwise constitute a shelf and also preventing any lodgment of ore. The water bottom is 5 ft. 6 in. deep and is used for water ballast in conjunction with a 9-ft. space formed by the hopper and the sides of the ship. This construction gives enormous water ballast capacity, approximating 8,500 tons, making the steamer navigable in all sorts of weather and providing extraordinary rigidity in the longitudinal section. The steamers will have thirty-four hatches spaced 12-ft. centers with no bulkheads whatever in the hold and will have a carrying capacity of 10,000 gross tons of ore. The hatch covers will be operated by the Brousseau device which is controlled by the American Ship Building Co. By this device all hatches may be opened and closed from a central station and



MIDSHIP SECTION OF THE STEAMER WILLIAM E. COREY.

[Building for the Pittsburg Steamship Co. by the American Ship Building Co.

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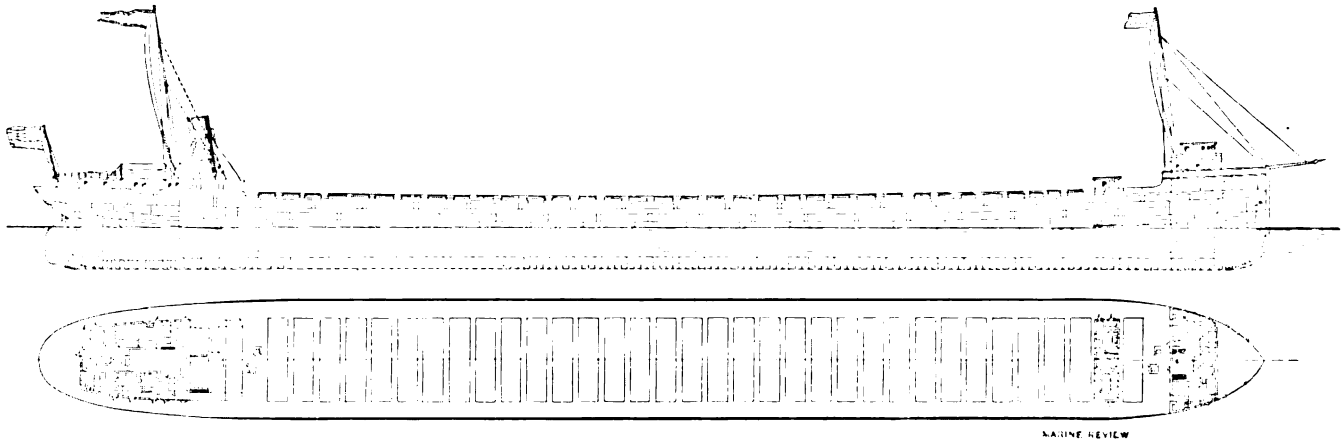
it is estimated that two men can do the work in twenty minutes.

The engines will be triple-expansion with cylinders 24, 39 and 65 in. diameters by 42 in. stroke, supplied with steam from two Scotch boilers 15 ft. 4½ in. diameter by 11 ft. 6 in. long, fitted with Ellis & Eaves' induced draft and allowed 170 lbs. pressure. In auxiliary equipment they will be more complete than any vessel now on the lakes. They will have Globe windlasses and capstan and Globe steering and mooring engines. Each steamer will have two complete direct-connected lighting plants of sufficient power to light every part of the ship. The steamers will be of steel construction throughout and will be lined with wood. The two vessels under construction at the South Chicago yard are to be named E. H. Gary and Wm. E. Corey; the one at the West Superior yard, George W. Perkins, and the one at West Bay City, Henry C. Frick.



PROFILE AND DECK PLAN OF THE STEAMER WILLIAM E. COREY.
Building for the Pittsburg Steamship Co. by the American Ship Building Co.

PORT HURON SHIP BUILDING COMPANY

The new Port Huron Ship Building Co., Port Huron, Mich., which is a consolidation of the Jenks Ship Building Co. and the Dunford Dry Dock Co., will, when its plant is completed, have one of the most modern yards on the great lakes. The officers of the new company are: S. G. Jenks, president; F. J. Dunford and W. G. Jenks, vice presidents; G. W. Moore, treasurer, and A. M. Carpenter, secretary. The plant of the new company embraces thirty-three acres with a river frontage of 2,100 ft. The dry dock, which is now 400 ft. long, will be lengthened to 700 ft. and the gate widened so as to admit a 60-ft. boat. This is a most important feature as the beam of ships on the lakes is likely to be widened as the demand for added carrying capacity grows. There will be three ship building berths, one alongside the dry dock about 400 ft. long and two on the bank of St. Clair river, one 700 ft. long and the other 800 ft. Following lake custom all vessels will be launched sideways.

All of the important buildings will be of steel frame work, equipped with electric traveling cranes. At present buildings for the operation of ship construction only will be built. Later in the year new buildings for machine shop, boiler shop and foundry, and also a fine office building will be built. Electric power will be adopted for all machinery with the exception of air compressors and dry dock pumps which will be installed in the power house. Electric traveling cranes will be built for the berths as the work progresses. A set of shear legs or a wharf crane with a capacity of 75 tons will be erected on the lower end of the property. An electric traveling crane will also be built over the storage racks.

Piles and timber to be used in the construction of the dock are now arriving on the property and one berth will be ready by spring. The steel work for the buildings is now under construction and everything will be ready for erection as soon as the weather is fit.

The plant will be modern in every respect and so laid out as to handle new and repair work expeditiously.

REMODELING MILWAUKEE'S FIREBOAT

Plans have been completed by Mr. W. J. Wood, naval architect of Chicago, for rebuilding the old fireboat Cataract of the Milwaukee fire department and the new steamer when completed will be known as "M. F. D. 29." The present Cataract is an old wooden boat, and the plans call for a new steel hull, the installation of a new boiler, and the complete overhauling of the present engines and pumps. When it is finished the new boat, although not so powerful as M. F. D. 15, will be the handsomest of Milwaukee's four fire boats.

The hull will be 105 ft. over all, 95 ft. between perpendiculars, 25 ft. 7 in. beam and 12 ft. deep. Pumping engines of 500 H. P. with a pumping capacity of 6,000 gallons per minute will be installed. The propelling engines will be of 650 H. P., making the new vessel a speedy one. A dynamo with a capacity of seventy incandescent lights and a 13-in. search light will form part of the equipment.

The new boat will be equipped with a 3-in. Monitor nozzle of the Milwaukee patent. By the use of this new appliance one man can operate the nozzle without the use of a cog wheel. This nozzle will be installed over the pilot house. In addition to this, fourteen connections for 3½-in. hose will be placed around the pilot house.

A new feature of the boat will be a 45-ft. water tower which will be placed amidships. This tower will throw a 2¼-in. stream a distance of 400 ft., at an elevation of 1 ft. from the horizontal.

The deckhouse will be of steel and will be 65 ft. in length. It will contain the pilot house—which will accommodate thirty persons—the upper engine and boiler rooms. The pilot house will be finished in curly birch and the engine room in mahogany.

The hold will contain eight watertight compartments. Under the main deck at the stern will be a tool room, containing hose racks, a workshop with tools and lathe, and space for the effects of the firemen. In front of this will be the engines, boilers and coal bunkers. In the forecastle will be located the steam steering apparatus and hose. Two large whistles, one 8 in. and the other 5 in. in diameter, will be installed. Because of the frequent calls for the fire boats to assist horses which have fallen into the river, the new boat will be equipped with a portable derrick so that the animals may be easily rescued.

The Northwestern Steamship Co., Seattle, Wash., will build two steam schooners.

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TWIN-SCREW STEAM YACHT

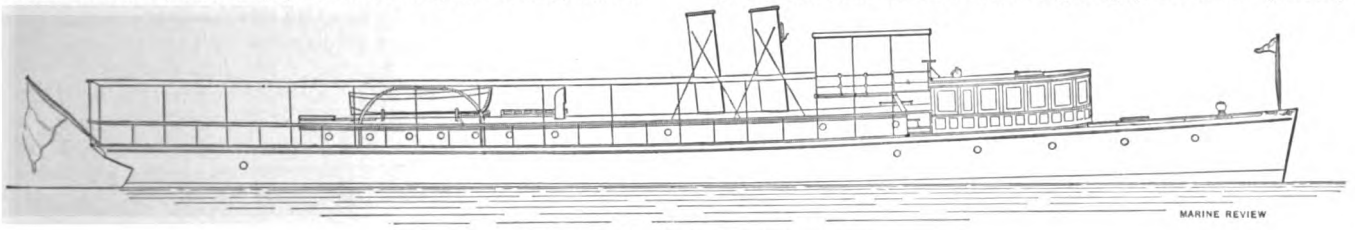
There is now in course of construction at the works of the Gas Engine & Power Co. and Chas. L. Seabury & Co. Consolidated, Morris Heights, N. Y., what is expected will be one of the swiftest steam yachts afloat. It has been ordered by a well known New Yorker and sportsman who has decided to devote much of this season to yachting. He intends to cruise and make frequent daily trips between his country residence at Croton on the Hudson and New York. Mr. Chas. L. Seabury, the naval architect, is now at work on the vessel. When it is remembered that Mr. Seabury has turned out such flyers as the Vixen II, owned by J. D. Archbold; the Adroit, owned by Alfred G. Vanderbilt; the Niagara IV, owned by Howard Gould; the Kanawha, owned by H. H. Rogers; the Levanter, owned by Alfred Marshall; the Velthra, the property of Parker Bremer, a Boston yachtsman; the Jule, owned by Alfred Costello; the Advance, owned by W. W. Cole, and other equally fast boats, it seems probable that this new yacht will be equal, if not superior, to those mentioned, in the matter of speed, comfort and substantial construction.

The yacht will be 120 ft. over all, 115 ft. 6 in. on the water line, 12 ft. 6 in. beam, 4 ft. 6 in. draught, and will have twin-screws. She will be classified as a wooden vessel, though there will be much steel in her frames and cross sections. She will have two smokestacks which will afford ample draft to her boiler. The plan of the yacht shows a pleasing looking and able craft. There is a low cabin house on the forward deck of such length as to give the necessary interior space for dining accommodations. This room will be fitted with a sideboard, divan seats on either side, and at the after end there will be an enclosed lavatory. The boat will be handled from a bridge spacious enough for settees, and will have a mechanical telegraph and the usual signal bells and pulls to the engine room. There is considerable space between the forward deck house and the trunk cabin which extends some distance aft where the owner's quarters are to be located, and protected from any discomfort due to heat or noise from the engine room, by a steel bulkhead and air space.

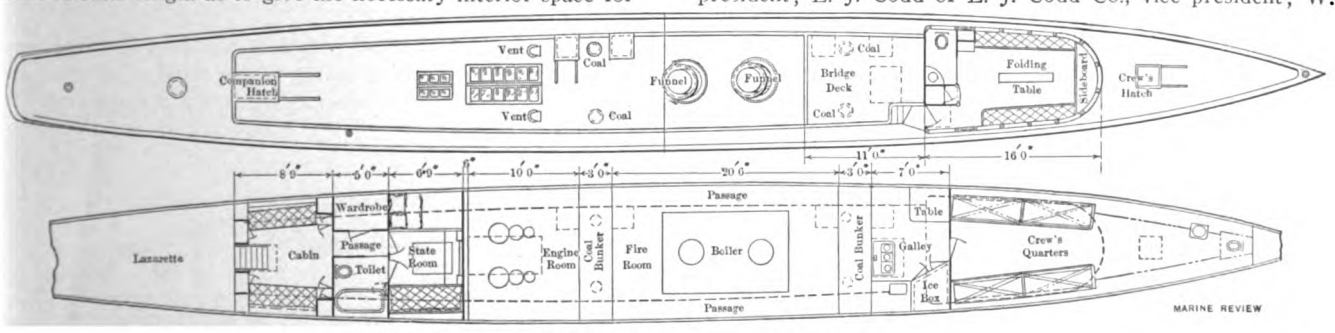
The owner's staterooms extend the full width of the yacht. It will be fitted with a bed, large divan seat, with lockers, dresser, etc. Following on starboard side will be a bathroom, having hot and cold, fresh and salt water, and other conveniences. On port side opposite will be a wardrobe. The main saloon is in the after portion of the ship. It is to be of liberal proportions, with lockers at both ends and seats on either side, which may be used for berths if necessary. From the saloon the deck will be reached by a wide companionway. The deckhouses, skylights, hatches, companionways and deck fittings will be of mahogany, and the house will be strengthened where practicable. The interior finish of the pilot house and the quarters aft will be varied in paneled butternut. The carpets and curtains will be handsome. The galley is forward of the engine room. In the forecastle will be found room for eight men and the accommodations needed.

The yacht will be equipped with two Seabury triple-expansion engines and a Seabury boiler and auxiliary machinery. There will also be an electric lighting plant with dynamo; storage batteries and a projector. Two small boats will be carried on the davits, and in every respect the yacht's equipment will be complete. The delivery of the craft is fixed for April 10.

It will be interesting to note just what this new yacht will do with the many other flyers owned by prominent yachtsmen that are daily to be found during the season on the Hudson and the Sound. Her designer and builders believe, after she has been running a while and her machinery has become smooth, that she will hold her own in any competitive test.



PROFILE OF HIGH SPEED STEAM YACHT.
[*Building by the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, New York.*



DECK PLAN OF HIGH SPEED STEAM YACHT.
[*Building by the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, New York.*

The Ship and Marine Engine Builders' association of Baltimore held its annual meeting last week. Following are the officers elected: James Woodall of W. E. Woodall & Co., president; E. J. Codd of E. J. Codd Co., vice president; W. J. Fox, manager of Oliver Reeder & Sons, secretary and treasurer; executive committee, Harry G. Skinner of Wm. Skinner Ship Building & Dry Dock Co., James Woodall, E. J. Codd, W. J. Fox, Walter Ancker, receiver for Baltimore Ship Building & Dry Dock Co., Capt R. M. Spedden, Spedden Ship Building Co. The annual banquet will be held at the hotel Rennet.

The Bethlehem Steel Corporation has been organized to succeed the United States Ship Building Co. The officers of the company are: Charles M. Schwab, president; Edward M. McIlvain, vice president; Henry S. Snyder, treasurer; John A. McGregor, assistant treasurer; B. H. Jones, comptroller. The directors are Charles M. Schwab, chairman; George R. Sheldon, Thomas F. Ryan, Pliny Fisk, John E. Borne, C. W. Wetmore, Oliver Wren, Archibald Johnston and Edward M. McIlvain.

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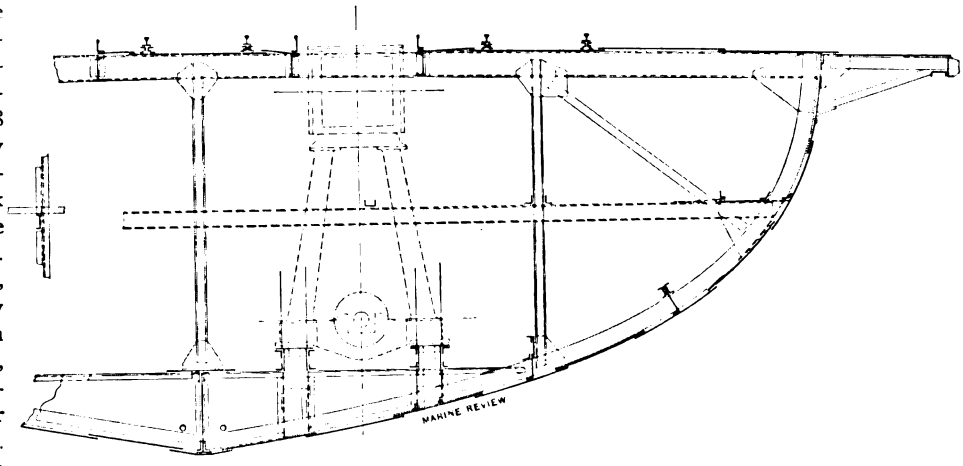
CAR FERRY DETROIT

In the Marine Review of Oct. 27 was given a brief description of the car ferry Detroit launched from the yards of the Great Lakes Engineering Works on Nov. 12, 1904. The Review is now enabled to give a more extended description of a very interesting vessel, especially with reference to her machinery, which is naturally the vital point in a boat designed as this is for heaviest winter work. The Detroit is 368 ft. long on deck; beam, molded 64 ft.; beam over guards 76 ft.; depth molded 19½ ft.; displacement loaded 3,850 tons. She is fitted with rudders at bow and stern and the general plan of propelling machinery includes four screws, two forward and two aft, driven by independent engines, and as the hull lines are practically identical at both ends she is prepared to work equally well in either direction. A description of one engine will serve for all, as they are identical. They are of the usual vertical inverted type, compound, with cylinders 24 and 48 in. diameters, by 33 in. stroke, designed to work under a pressure of 150 lbs. steam. This pressure, however, will only be carried when battling with ice, the ordinary pressure in open water will be 100 lbs. The engines are exceedingly heavy and built to withstand the strains and shocks of the severest service. The crank shafts are of the finest open-hearth steel, of the built-up type with all cranks counterbalanced. The shafts are 10¾ in. diameter and the crank pins 10 in. diameter and 10 in. long, and crank pins and journals are ground. In this connection it may be said that the Great Lakes company claims the distinction of being the only concern in its line equipped for so finishing work.

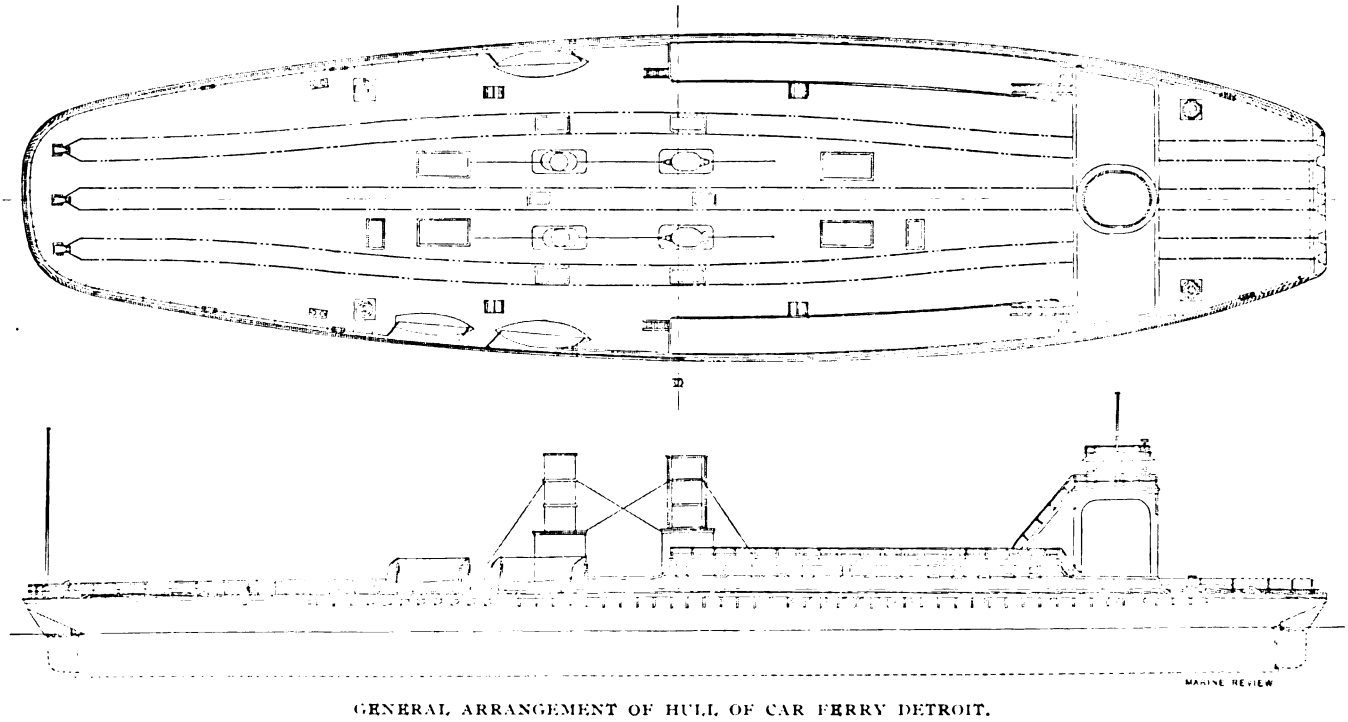


SECTION THROUGH ENGINE ROOM OF CAR FERRY DETROIT.

The crossheads are very heavy with unusual surfaces, the maximum load on the guides not exceeding 50 lbs per square inch. The crosshead pins are 6 in. by 9 in. of tool steel, ground all over. The guides are hand scraped to a perfect bearing and are water jacketed. The piston rods are 5 in. diameter of hammered steel, ground all over and fitted as well as the valve rods with metallic packing. Steam reversing gear of usual direct type is fitted. The Review is assured by the builders that the like parts on these engines throughout are absolutely interchangeable and that in proof of it they were taken at random as they came to the erecting floor and without a hitch, all parts being made to standard gauges and templets. This is a new feature in marine engine construction and would seem to be of value to the owner.

The thrust shafts are 11 in. diameter with six collars. The thrust shoes are water jacketed. The line shafting is 10½ in. diameter. The tube shaft and tail shaft is 11¼ in. diameter, 11¾ in. in bearings and are coupled just aft of the boss bearing by a massive steel split sleeve coupling to permit of drawing the tube shaft inboard. The boss bearings are interchangeable with the bracket bearings. The tail shafts are taper fitted to the propellers which are solid, four-bladed, 10 ft. 6 in. diameter, 14 ft. 6 in. pitch and are of course extremely heavy. The brackets are of cast steel and are reinforced by a diagonal fore and aft member which is cast in one piece with the vertical strut. The lines of the hull made bossing out impracticable and brackets had to be resorted to.

The auxiliary equipment includes two twin vertical air pumps (one in each engine room) of the "Great Lakes" type with jet condensers. The steam cylinders are compound 13 in. and 22 in. diameter and the pumps are 27 in. diameter.



GENERAL ARRANGEMENT OF HULL OF CAR FERRY DETROIT.

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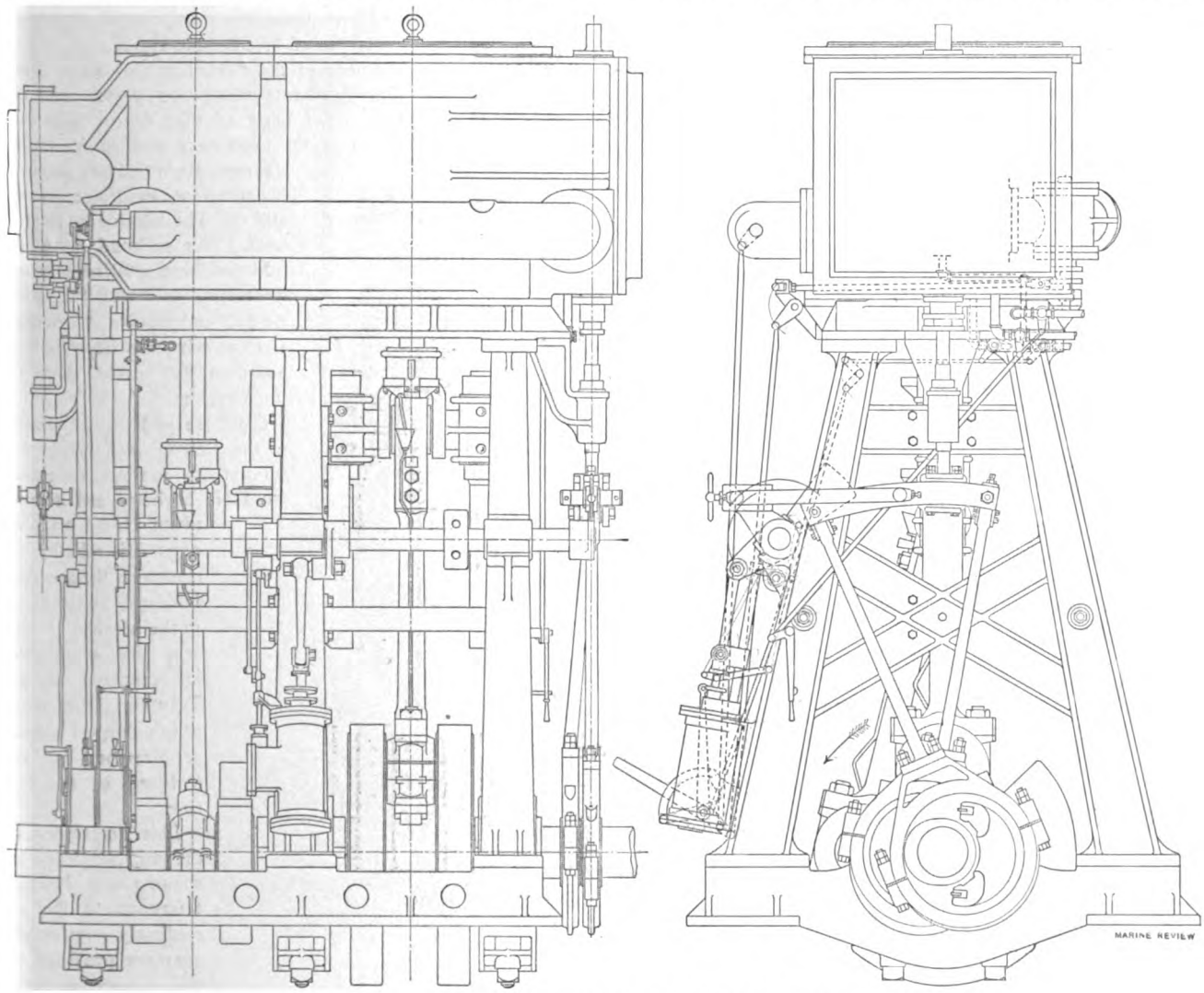
the stroke of all 14 in. The illustration gives an excellent idea of the general design of these pumps.

The boiler feed pumps are in duplicate, of the single, outside end packed, pot valve type with 8 in. and 16 in. steam cylinders and 7 in. water plungers, 14 in. stroke. The arrangement of boiler feed deserves special mention. It is the practice in this service to shut down the air pumps when the steamer has made fast in her slip since she may lie half an hour or two or three hours, and as it would entail endless trouble to be continually starting and stopping the feed pumps when the hot well supply is cut off by the stoppage of the air pumps a large hot well or feed tank is installed and which holds about 8 tons of water. Into the bottom of this tank the after air pumps discharge, the overflow is from the top overboard. A tank pump, 8 in. by 5 in. by 10 in. duplex, delivers water from this hot well into an open heater of the Cochrane type, and which so far as known is the first open heater installed for marine purposes, and from which the feed pumps take suction. The tank pump and the feed pumps are fitted with Gardner pressure governors and the feed supply is controlled entirely by the feed valves at the boilers. If closed the pressure governor immediately stops the feed pump and when opened the pump at once responds without further attention. With the stopping of the feed pump, of course, the water level in the heater rises and in doing so operates a float which closes a valve in the delivery from the tank pump and the governor on the latter immediately puts the pump out of action. Thus the water tender in the boiler room operates the whole system by the regulating of his feed valves. Into the heater referred to the exhaust steam from pumps, fan engines, electric engines, steering gear, etc., are all conducted. Even the wastes from the heating system are trapped and saved and no heat is allowed to go to waste. The exhaust steam is passed through a Cochrane separator which effectually eliminates all oil and makes it possible to utilize the condensed and distilled water for boiler feed.

The fire pump is of the duplex outside end packed pot valve type, 8 in. by 5 in. by 10 in. A sanitary pump is fitted in each engine room and connected together to the general water service which supplies the quarters as well as the engine room water service. Governors are also fitted to these pumps, making the entire water service automatic.

Two 10-k. w. direct connected lighting sets of the Fuller Co.'s make are installed, the smaller set for day lighting in engine and boiler spaces. The electric installation also includes a large search light with 18-in. projector.

The boilers are four in number of the Scotch type, two double ended, 13 ft. diameter and 22 ft. long, and two 13 ft. diameter and 11½ ft. long, built for a pressure of 150 lbs. steam. All furnaces are 44 in. diameter of the Morison removable corrugated type. Water spaces separate all combustion chambers in both single and double ended types. It frequently happens that at the season of the year when the ice is at the heaviest the coal supply is most uncertain and its quality inferior, and to insure the steam supply under the most adverse conditions a system of mechanical draft on the closed ash pit system is fitted. For all ordinary service not more than a part of the boiler plant will be required and it



GENERAL DRAWING OF ENGINE OF CAR FERRY DETROIT.

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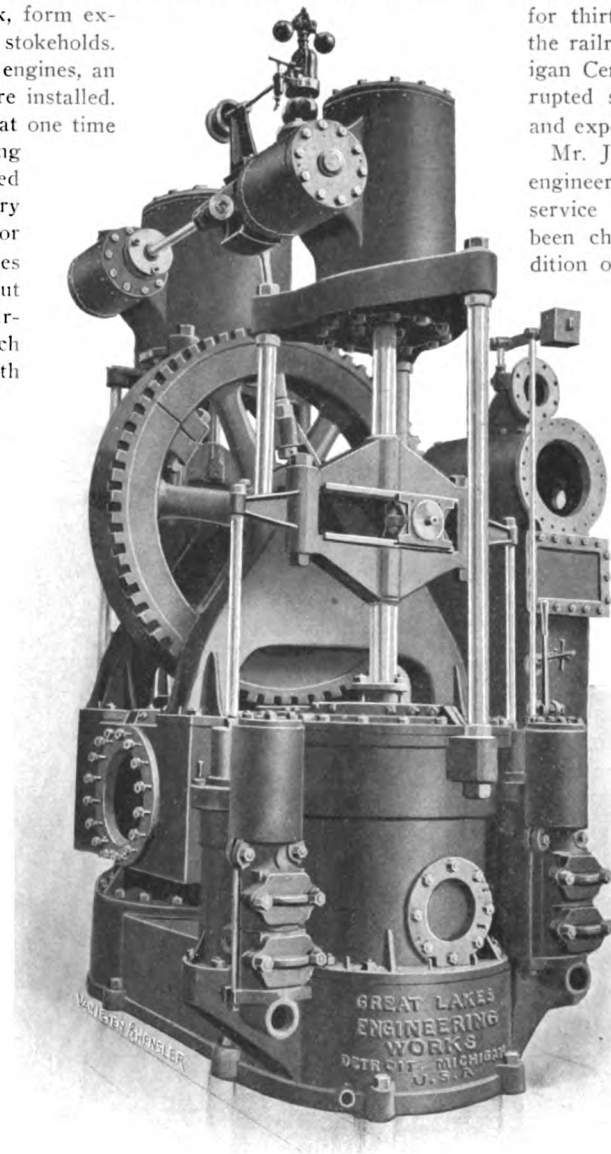
is not expected that even in the ice the fan system will be called upon except with inferior fuel.

Four "Great Lakes" ash ejectors are fitted, two in each stokehold. The stokeholds are exceedingly roomy, lavishly so in fact, but space is abundant and it is no wonder the designing engineer reveled in the opportunity of a lifetime. In fact abundant room is a striking feature throughout the entire engine and boiler space. The smoke stacks are double, of oblong section and are carried 35 ft. above the deck. The rectangular casings through which the stacks are carried and which extend 14 ft. above the deck, form excellent ventilating trunks for the stokeholds. Bath capstans and Brown steering engines, an independent set for each rudder, are installed.

With so many engines in action at one time it will be seen at once that something more than a good memory is needed to keep a record of signals and a very neat device has been worked out for the purpose which not only indicates that the signal has been given but that it has been acted upon and further shows in which direction each engine is working. Combined with each of the four ordinary crank bell pulls, which are neatly and conveniently grouped together in the pilot house, is an electric bell device operated by a push button passing down through the handle of each crank lever. Closing the circuit by pressing these buttons rings an electric bell in the engine room and that the bell actually rings is indicated by a small electric lamp in front of the pilot and which glows only when the bell circuit is closed. Four pair of red and green midget lamps are also placed in view of the pilot, one pair for each engine, and when the engine is working ahead a circuit is made through a green lamp, and when astern through a red lamp. When engines are stopped both lights are dead. The bell and signal systems are operated by current from the main switchboard on which there is current at all times. The system is chiefly the design of Capt. Harry L. Innes.



AIR PUMPS OF CAR FERRY DETROIT.

The ship is fueled from bottom dump cars which are run upon the outside tracks and dump directly into the bunkers, the fuel hatches being 40 ft. in length and the full width of the space between rails and 200 tons of coal can be taken in a few minutes without trimming. The total bunker capacity is about 300 tons.

The hull of the Detroit is said to be the strongest ever built on the lakes even for ice work and has been most favorably commented upon by all who have inspected it. Excellence also characterizes the workmanship throughout and while the engineer will be attracted by the convenience of the machinery and boiler arrangement and the prodigal provision of strength in all parts and the evident care in construction, the ship builder cannot fail to note the finished workman in the beautifully fair plate work, the good fitting and perfect riveting. Capt. F. D. Herriman, surveyor general to the Great Lakes Register, who represented the owners, the Michigan Central Railroad Co., during her building, pronounces her the best job of ship building he has ever seen.

Capt. Jas. R. Innes, superintendent of ferries, has been in the service for thirty-two years, holding his present position for thirty years, and the fact that of all the railroads crossing at Detroit the Michigan Central has suffered least from interrupted service is largely due to his skill and experience.

Mr. John W. Westaway, the able chief engineer of the fleet, has also been in the service almost thirty-two years, and has been chief most of that time. The condition of the machinery and equipment of the company's floating property is sufficient evidence of his ability. The history of the Detroit River railroad ferries as told by these gentlemen is an interesting tale and full of incident, and serves to emphasize the advances from the first boats in the service down to the Detroit.

Capt. Harry L. Innes, master of the Detroit, has been in the service in various capacities from his boyhood and is now about thirty years of age. His selection as master of the new ship indicates his standing in the service. He has been for some time in command of the Transfer, the company's largest steamer previous to the building of the Detroit.

This description of the ship would be incomplete without a reference to the exceedingly comfortable quarters provided for the accommodation of the force. Although on these boats the crew, generally speaking, live ashore there are quarters provided for the use of a certain portion if they so choose.

The superintendent has a suite consisting of office, parlor, bedroom and bathroom; the superintending engineer also has a suite consisting of parlor, bedroom and bathroom, and the master, mate, first engineer and the United States and Canadian customs officers are each provided with roomy, comfortable apartments. The finish of all is in natural oak, open plumbing with running water and hot water as well to the bathrooms, with a liberal allowance of leather couches, arm chairs, rugs, etc., make the accommodations equal to those on any modern ship.

Although the Detroit was delivered to her owners on Dec. 16, it was not until Jan. 13 that ice conditions became so serious that she was sent down the river to attempt to dislodge the

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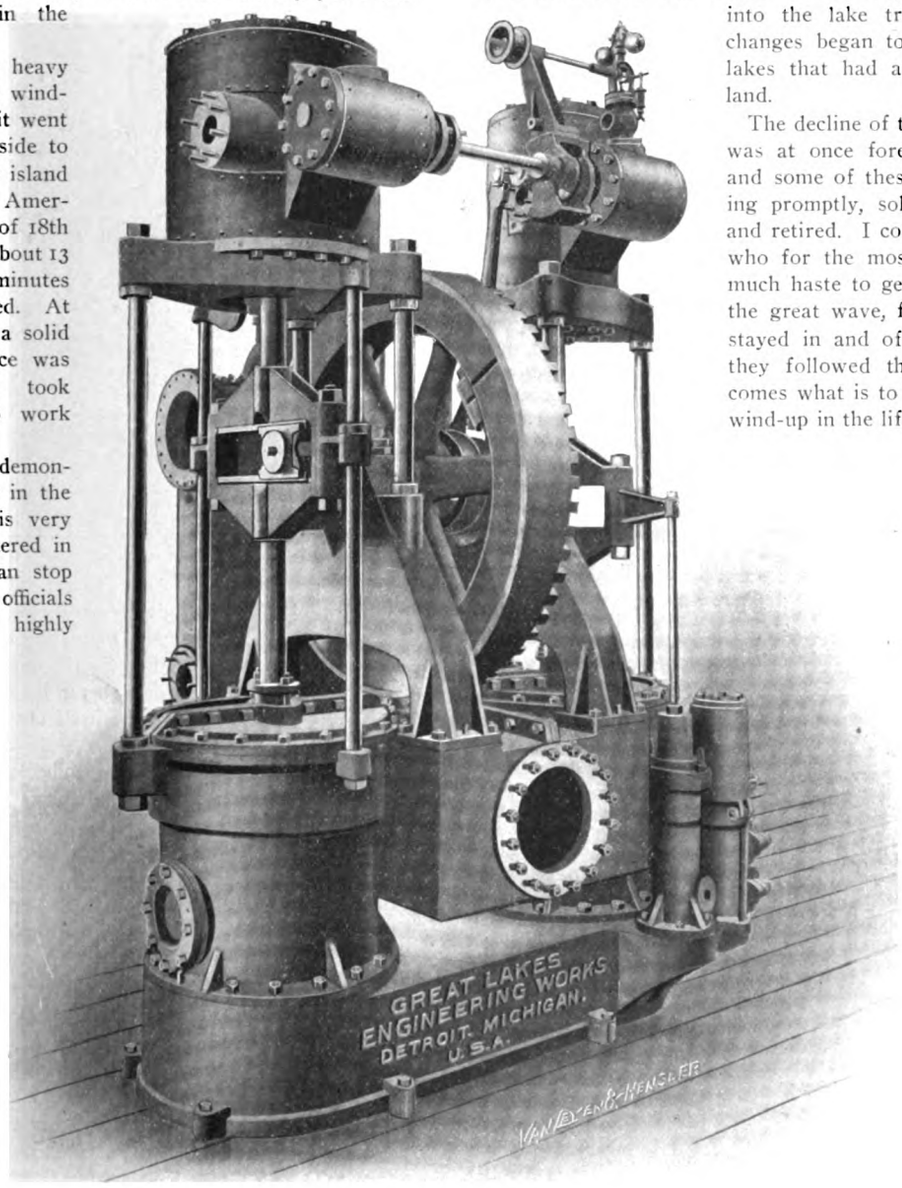
bridge above Fighting island with a view to remove the blockade which threatened to blockade the transfer service. On board were: Capt. J. R. Innes, superintendent of ferries, Michigan Central railway; Mr. R. H. L'Hommedieu, general manager, Michigan Central railway; Mr. D. S. Sutherland, division superintendent; Mr. E. T. Bronner, superintendent motive power; Mr. H. Penton, Great Lakes Engineering Works; and Capt. L. R. Boynton, who for twenty years has been fighting ice in the straits of Mackinac.

The ice was very heavy and in places badly windrowed, yet the Detroit went down the Canadian side to the head of Fighting island and returned up the American side to the foot of 18th street, a distance of about 13 miles in 1 hour 35 minutes without being stopped. At this point, however, a solid bank of grounded ice was encountered which took nearly an hour to work through.

The trip amply demonstrated that nothing in the way of ice which is very likely to be encountered in the Detroit river can stop the Detroit. The officials on board were highly pleased with her performance and Capt. Innes, who has spent over thirty years in the service, said he never saw worse ice than was encountered on the trip. Capt. Boynton, whose experience and judgment can hardly be questioned, pronounced her a wonder. The speed made through the heaviest ice may be imagined when it is stated that she has been driven hard enough to pile ice high on her forward deck. At times it has been estimated that there has been 20 tons of ice on deck. This is, of course, with the ship loaded with a full load of cars. The Detroit has carried twenty-four steel hopper cars with a gross weight of 1,700 tons. The judgment of all who have seen her at work is that she will be able to maintain the service under the worst possible conditions ever likely to be encountered in the river.



AIR PUMPS OF CAR FERRY DETROIT.

THE CHANGES IN LAKE TRADE

Buffalo, Feb. 7.—The wave of concentration that has swept over the country in late years has upset practically everything in its course, though there are those who say it is no more radical in its influence than the advent of the early stock companies, which created quite as great a disturbance as the trusts have done It was about the day when John D. Rockefeller discovered that he had a few surplus millions to put into the lake trade that the same changes began to take place on the lakes that had already appeared on land.

The decline of the individual owner was at once foreseen and predicted and some of these, taking the warning promptly, sold out their vessels and retired. I could name not a few, who for the most part were in too much haste to get out of the way of the great wave, for the more plucky stayed in and often did well before they followed the lead. And now comes what is to be pretty nearly the wind-up in the life of the small vessel in the through trade, unless it is in some way specialized, as in case of package freight or lumber. It may be somewhat premature still, but the word seems to be "go or be left on the bar."

I asked an old vessel owner the other day, a man who is as shrewd and well abreast of the times as anyone, what was to be the size of the lake vessel of the future. Had we reached the limit yet? He answered that it was near to it, but the coming vessel as he saw it was a 15,000-ton carrier, 550 ft. long and 60 ft. beam. The harbors that could not handle such a craft were out of the race and the vessels that did not rank somewhere in that class would have to be left out. This is why the fleet of whalebacks were sold the other day to be sent to salt water. It is the scrap heap for them here if they stay and there may be something for them on the coast awhile yet.

It is decidedly odd that this fleet has some actual limit of life

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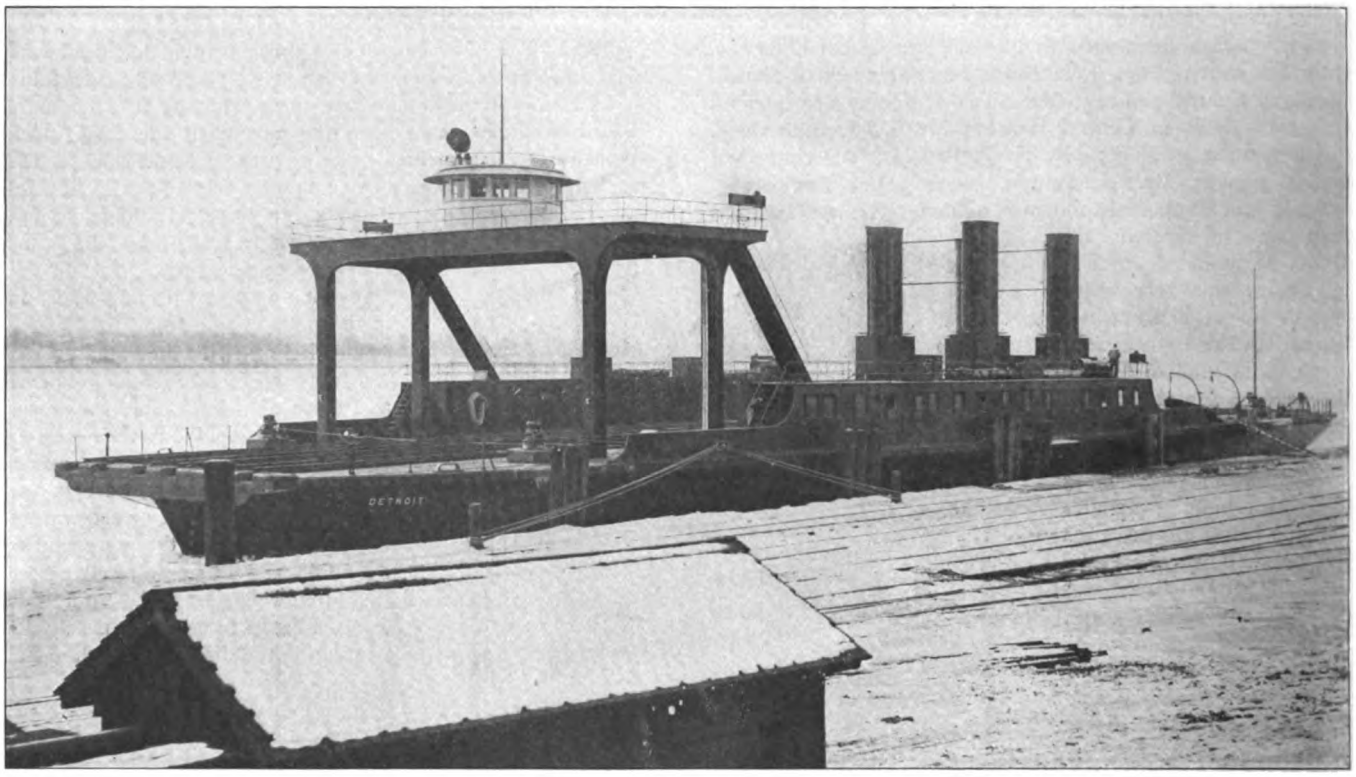

MICHIGAN CENTRAL RAILWAY CO.'S CAR FERRY DETROIT.

before it on the ocean, but here it is immortal still. Manager Drake of the Inland Lloyd's Register is still saying that he has discovered nothing in the structure of a steel hull on fresh water that looks like decay or decrepitude. Rivets may rust off or neglect may impair something else, but when they are replaced all is new again. So the moderate-sized steel vessel is the problem of the day on the lakes. It refuses to follow the wooden vessel and take itself out of the way on the old age plan.

J. R. INNES.

Again our oracle: "What is to become of the 3,000-ton vessel? It has no future. The owners of such might just as well get what they can out of them quick and then tie them up. The big carriers will do the business and do it at a rate that will mean less than running expenses to what we call the small steamer today. The lumber trade has no use for them, there is nothing new to put them into. The ports that need them will not long hold their own with the ports that can handle the full-size steamer.

It is the coal trade at this port that feels the change of cargo size most. Fifteen years ago the average cargo was less than 1,000 tons, now it is well up to 4,000 tons, in spite of the effort of the lumber fleet to get up-cargoes of it. Not long ago the water-coal trestles gave cargoes to three small craft at the same time and had coal in plenty to keep all busy, but now the big craft, when chartered, set the coal company to massing up cars at all its available yards after the trestle pockets are filled. And we are seldom getting vessels to load which will carry more than half the expected limit of the near future. This means an easy control of the rate between the shipper and the big carrier. Coal used to pay 75 cents a ton and upwards, now it pays 40 cents or less. The big carrier can make money at it, the small carrier will lose money, for the cost of operation is more than it used to be, reckoned on the old basis. The big carrier wins by the formation of a new basis with crew cut down to minimum and many appliances made to answer as before or left out.

The shore charges, always a great item in the current expenses of a vessel, may not be so greatly in favor of the coming craft, but they will not be neglected. As evidence of the care taken in such matters a package-freight manager said the other day that he was insisting on the loading of his cargoes entirely with reference to the condition of his warehouse when the vessel arrives here. A certain lot can go

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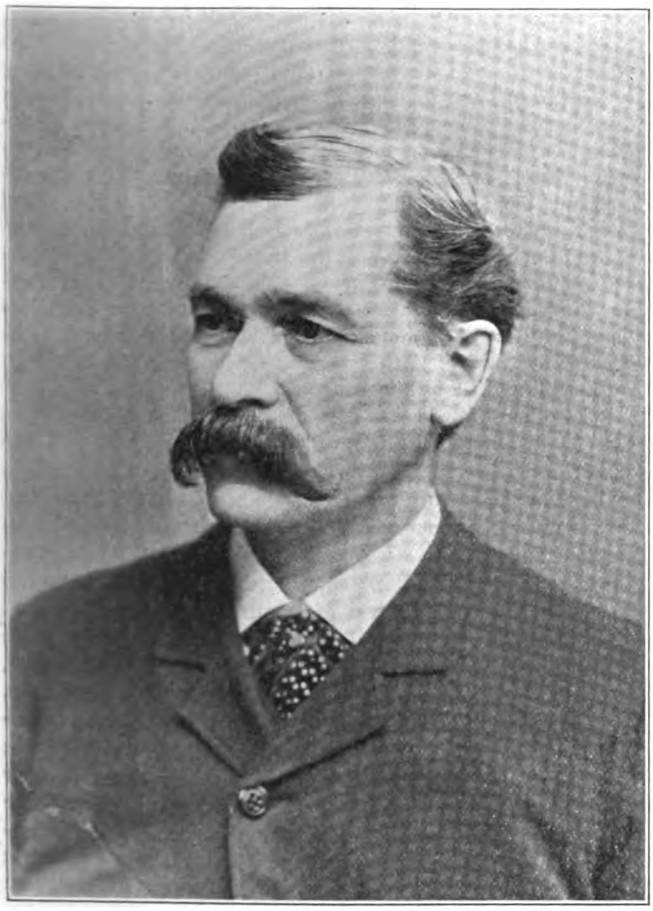

J. A. WESTAWAY.

to the cars direct, another lot must be left in a certain part of the warehouse and another lot somewhere else. Loading the cargo without reference to these conditions may easily so cross the lines of the handlers here as to cut down the value of their work 25 per cent, according to the manager's estimate. He says the idea is new, but is valuable, as anyone can see. So the eager struggle for leadership goes on.

JOHN CHAMBERLIN.

PACIFIC COAST SHIPPING LETTER

San Francisco, Feb. 4.—That the Pacific coast is feeling the world wide depression in shipping, and consequent demoralization in freight rates, is well evidenced by the number of deep water vessels that have recently left our shores in ballast seeking cargoes in other parts of the world. This fleet numbers since July 1 last, forty or more vessels of an aggregate tonnage of over 78,000 tons, and principally bound to Australian ports. The cause is of course primarily the lowness of freight rates, but secondarily is traceable to the shortage of the California wheat crop, together with the high price at which the commodity is held here.

In marked contrast to the departure of the ballast fleet is the sailing for New York of two American wooden vessels—a contrast because the departure of the barkentine Holliswood a few days since marks the end of a period beginning with May 26, 1903, when the steamer Anjar sailed hence with general cargo, and continuing to the present, during which period not a single American sailing vessel has made the run from San Francisco to New York. Noteworthy in at least two other respects is the Holliswood's sailing. First of these her cargo consists of 2,000 tons of California oil asphalt, intended for use in laying pavements in New York city, and said to be the largest single movement in the history of the industry. It is to be hoped this cargo is but the forerunner of many more that may provide some sort of profitable employment for the American square-rigger. The second noteworthy incident in the departure of this vessel is that she has been specially rigged for this one trip. On July 4, 1904, she came to an anchor in San Francisco harbor, with 1,500 tons of coal from New Castle, Australia, after a terrible voyage on which she was partially dismasted and leaked so badly she was only kept afloat by use of her steam pump. Originally a two skysail yard bark she limped into port with her bowsprit broken off sharp at the bob-stay barb, fore-top-gallant and royal masts gone, and only her fore yard crossed, and on her main everything gone above her cross-trees. During her long stay in port she passed into the hands of Pendleton Bros. of New York, who, after securing a charter that would take her to the east coast, determined to make her into a three-masted bark—entire for the voyage. It is their intention upon her arrival in Atlantic waters to again change her rig to that of a four-masted schooner. The lapse of a few years more in all probability will see yet another change—to the ignominious state of the coal barge, to be towed by the nose from port to port. Now that the spell is broken the large American ship Shenandoah is loaded and ready to sail for New York with a California cargo—scrap iron, asphalt, wine and canned goods.

A new comer to the coast trade is the schooner barge

H. L. INNES.

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Monterey, recently the British ship Cypromene. This vessel was ashore last year at Salina Cruez, and after floating was sent to San Francisco for repairs. While sailing into the Golden Gate she struck on Mile Rock, seriously damaging rudder and stern post, and sufficient outlay on repairs was necessary to entitle her to the American flag. She passed into the hands of the Matson Navigation Co. of San Francisco, and has been converted by the United Engineering Works for their order into a schooner rigged barge for carriage of oil in bulk. To this end she was stripped of all her yards and her royal masts, the lower and topgallant masts, with standing rigging, remaining. Although intended for a tow barge the Monterey can still spread sufficient canvas in the shape of staysails, jibs and trysails, to care for herself in an emergency. Her hull, after thorough repair of the stranding damage, has been prepared for the carrying of oil by the erection of suitable thwartship and fore-and-aft bulkheads. The thwartship bulkheads of steel are two in number, one being well forward and about abreast of her foremast, and the other well aft. They are stiffened fore and aft by strong steel braces and of course are "oil-tight." The vessel is then divided into a number of tanks by fore and aft, and thwartship bulkheads of heavy timbers. The pumping plant is located in the fore-hold, just forward of the forward bulkhead, and consists of two large centrifugals, steam being furnished from a large donkey boiler located in house on main deck. Expansion trunks are built above the old hatch comings, and ventilation is provided from the top of these expansion trunks by pipes leading to the hollow steel lower masts, which are so arranged that they will carry off any gases that may form, at the masthead. In like manner the foremast is utilized for a smoke stack for the donkey boiler. The barge is electric-lighted, electricity being furnished by a small dynamo driven by a gas engine. Her capacity is said to be 18,000 bbls. Monterey to date has been towed from port to port by the large Spreckles' tug Dauntless.

Puget Sound advices note the sailing of the steamer Minnesota on Jan. 23 on her initial voyage to the Orient. On the passage from Norfolk to Seattle this vessel had much trouble with fire in her bunkers. During her stay in port the bottoms of these bunkers, which are arranged in the form of hoppers, and from their construction and location subject to tremendous heat from the uptakes, have been completely insulated, and it is hoped that the source of the former trouble has been wiped out. Capt. John H. Rinder, late commander of the P. M. S. S. Co.'s Mongolia, and widely and favorably known as master of the steamer Coptic, is in command. Although Minnesota gets away on her first voyage with a full measurement cargo, her future will be watched with keen interest by Pacific shipping men, many of whom believe she is so far before her day she never can succeed in the trade.

Several vessels now in course of construction for the coastwise trade have about reached the launching stage at Bath, Me. The four-masted schooner Alice Davenport will be launched from the New England yard, Bath, Me., during the present month. Her measurements are: Length, 194 ft. 6 in.; beam, 39 ft. 4 in.; depth of hold, 18 ft. 3 in. The four-masted schooner building at the yard of Percy & Small, Bath, Me., for J. S. Winslow will also be launched this month. She is 179 ft. 4 in. long, 37 ft. 1 in. beam and 13 ft. 8 in. deep. The four-masted schooner building at the yard of the Kelley-Spear Co., Bath, Me., for R. R. Freeman of Bath is also well along.

It is understood that the Panama Railway Co. will have three 5,000-ton passenger and freight steamers built from designs by Horace See, No. 1 Broadway, New York.

LENGTHENING STEAMERS

Since the advent of the 10,000-ton ship on the great lakes vessel owners with smaller ships in their fleet have been giving orders for the lengthening of their vessels in order that the discrepancy between their carrying capacity and that of the modern carrier may be diminished. These orders for lengthening vessels were placed almost simultaneously with the orders for the larger ships, showing how quickly the vessel owner can recognize and adapt himself to changed conditions. During the past few weeks orders have been placed for lengthening the steamers G. J. Grammer, S. S. Curry, City of Bangor, Sevona, L. C. Waldon, Victory and the barge Constitution. With the exception of the Waldo, which is to be lengthened at the yard of the Craig Ship Building Co., Toledo, the work will be done by the American Ship Building Co.

It is to be observed that each of the vessels is to be lengthened 72 ft. Inquiry has been made as to why 72 ft. was the length decided upon for all of them. This length is simply a multiple of the hatch spacing which is 24 ft., thereby providing three new hatches, increasing the carrying capacity by a considerable extent without affecting the ship's stability. On the opposite page are some views showing the steamer G. J. Grammer undergoing the process of lengthening at the Cleveland yard of the American Ship Building Co. The Grammer is the first bulk freighter on the great lakes to be so lengthened, though passenger steamers have been lengthened before now. Afterthe Grammer had been placed in dry dock the rivets were cut out of the joints of various plates at the point where it had been decided upon to cut her apart. After the two parts were severed the weight of the part to be moved was taken from off the stationary blocking and transferred to the sliding ways which are practically the equivalent of the ordinary launching ways. After the weight had been transferred power was applied to draw the forward end of the boat the necessary distance to admit of the insertion of the section while the after end was left on the stocks. The forward end on lake freighters is selected to be moved because it is much lighter than the after end which contains the machinery of the steamer. After the forward end had been drawn the necessary distance the weight was again transferred to the stationary blocking and the process of building between the two ends is done in the same fashion as would be done in case of building an entirely new vessel. The illustrations on the opposite page show the various processes quite plainly. The power in the case of the Grammer was supplied by a locomotive and a team of horses.

In a few instances instead of drawing the severed end the necessary distance watertight bulkheads have been built back of the cut and the part floated to its required place. This method, however, has not proved as satisfactory as the one above described as it is much more difficult to get the two parts in proper alignment. What with new vessels to build and the old ones to lengthen the American Ship Building Co. has a great deal of work on its hands.

Capt. F. A. Grant of the quartermaster's department, United States army, stationed at Seattle, Wash., has received orders to advertise at once for bids for the construction of a steamer for the quartermaster's department. The vessel is to be 105 ft. over all, 22 ft. 4 in. beam and 10 ft. deep. She is to be used for towing targets, planting mines, transporting troops, provisions and ammunition to the fortifications along the sound.

Capt. C. F. Shoemaker, chief of the revenue cutter service, has begun the preparation of plans for the new revenue cutter recently authorized by congress for service in Pamlico Sound and Neuse river. The vessel will probably be a side-wheeler owing to the extremely light draught necessary.

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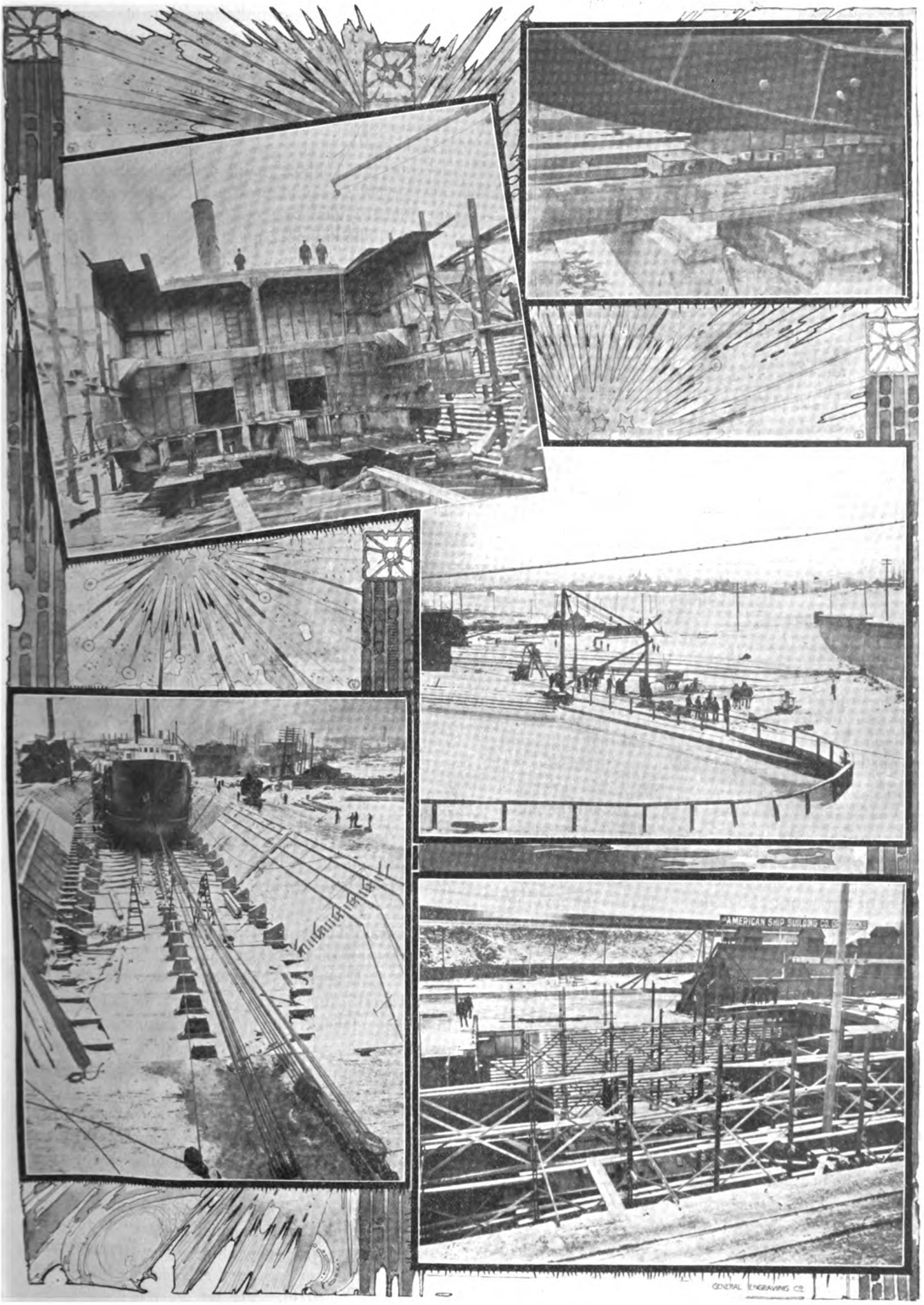

CUTTING THE STEAMER G. J. GRAMMER IN TWO AND DRAWING HER APART TO INSERT A 72-FT. SECTION AMIDSHIPS.
[*Work under way at the Cleveland yard of the American Ship Building Co.*

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FEBRUARY 9, 1905.

For its present issue the Marine Review has been at some pains to summarize ship building throughout the United States. It will be observed that ship building on the great lakes is a thriving industry and that some of the smaller coast yards have work under way for vessels for the coastwise service. It will be noted, however, that were it not for the extensive naval program under construction the great ship yards of the coast, which are the pride of the country, would be devoid of new work altogether. There is not now, nor has there been for four years past, a new order placed for vessels for the foreign trade—this, too, in the face of the fact that the foreign trade of the United States is the unrivaled trade of the world. This industry would not languish in the manner in which it does if there was not a reason for it. The reason is the higher constructive cost of ships in American ship yards, owing to the policy of protection, to which must be added the higher operating expenses of ships under the American flag. This condition is the direct result of legislation directed towards the protection of American industries. The condition will continue unless this same protective principle is extended to shipping in the foreign trade.

The Merchant Marine Commission, which made a tour of the United States during the past summer to investigate the causes which have led to the decline of American shipping in the foreign field, has presented a voluminous and lucid report to congress and has also submitted a bill seeking to remedy the evils which the commission discovered. The present session of congress is, of course, a short one and all hope of the passage of the bill during this session has now been abandoned. It is a measure, however, which ought to enlist the support of all parties because it has for its object the upbuilding of a great American industry, an industry vital to the permanent prosperity of the nation. The shipping question is neither political nor sectional. It is one which has direct relationship to practically every industry pursued by the people. A glance at the summary of ship building contained in this issue will show that no important merchant work is under way except on the great lakes. And yet no single work of man calls into exercise such varied abilities and consumes such varied products as the building of a ship. It stimulates a hundred departments of enterprise and gives employment to countless thousands of people. It is not alone those that are directly concerned in the building of a ship because their work is really the assembling of parts which other hands have created. Building a ship is constant work for someone from the moment the ore leaves the earth until it is wrought into the ship's sides or into one of the many instruments that make up the equipment of a modern vessel. No great merchant ship is now building on the coast with the exception of the Dakota for the Great Northern Steamship Co., and this steamer is practically completed.

Every year the United States pays in freight upon its enormous foreign trade the sum of $200,000,000, of which $186,000,000 is earned by foreign ships. It has been clearly proved that this trade cannot be secured for the American ship unless congress removes the handicap which now exists against shipping in this trade. The national government has really not been just towards the American ship. It has a right to demand strict justice and that is all that it is demanding.

The magnificent naval program now under way is the salvation of the great ship yards of the United States. It is not fair, however, to the capital that has been honestly invested in these great yards to compel it to depend wholly upon the continuance of a naval program. It requires an enormous expenditure of money to equip a plant to build a battleship. This money has been freely invested by capitalists in the hope that a first-class merchant marine would follow a first-class navy. The only way a first-class merchant marine can be had is to give it a fighting chance after it is created. The merchant marine is the natural reserve for the navy. The naval authorities at Washington freely admit that their chief concern is to get men enough to man these new ships. The naval program of the United States is not exceeded by any nation except Great Britain. Yet we are fast reaching the

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position of having a mighty navy with no men to man it and with no merchant marine for it to defend. It is time for congress to take action.

FREIGHT SITUATION

The first chartering this year has been done in the grain trade. One of the larger class of vessels has been chartered to load oats at Gladstone at the opening of navigation for Buffalo at 1¼ cents. It is understood that some chartering for storage and spring delivery at Buffalo has been done at Milwaukee on the basis of 2 cents on corn, which is equal to 80 cents on ore. Vesselmen, however, are not anxious to load their vessels at present. Stocks of grain are very heavy and are crowding the capacity of the elevators. There has been no discussion as yet upon the ore rate. It is a foregone conclusion that the movement of ore will be exceedingly heavy and will probably break all records, but carrying capacity has also been increased and it is questionable whether the added movement will sensibly affect the freight rate. Vessel owners represent that the rate should be 80 cents, arguing that trade conditions warrant a better rate than was paid last year. It would not be surprising if the rate settled at 75 cents, which would be 5 cents better than that which obtained last year. Appointments of masters are being made quite generally and there are no labor troubles in sight to disturb the general tranquility.

AT THE HEAD OF THE LAKES

Duluth, Feb. 6.—The Capitol Elevator Co. has bought the old Duluth imperial mill property, on Rices point, Duluth, ostensibly paying therefor the sum of $250,000. The 1,000,000-bu. grain elevator thereon is worth more than this and there is a 600,000-bu. elevator mill, which latter cost $500,000, as well as a plat of ground and water 1,900 ft. deep and 275 ft. dock line frontage, in a most accessible part of the head of the lake harbor, so the purchase was at a very reasonable price. It will not be used for a flour mill, not in the old building at any rate, and the disposition of that part of the property other than the elevators is not determined. They will be overhauled and operated. McCarthy Bros. & Co., large receivers of grain at Duluth, are chief stockholders in the purchasing company.

Grain stocks at the head of Lake Superior increased about 220,000 bu. last week, and are now the largest known for many years. Receipts are holding up to last year at this time, though the crop year to date is behind somewhat. Weekly shipments of flaxseed are large, nearly 10,000 bu. daily, to mills at Chicago and elsewhere, largely to those independent of the trust. The flour trade is very poor, and mills find it hard to get shipping directions of stock they shipped months ago.

At the works of the Superior Ship Building Co. more men are being added as material comes in, but the works have been exceedingly handicapped for some time by the lack of proper steel with which to carry on the orders for the large new ship and the lengthening jobs taken recently. A good deal of general overhauling, for the season, will begin on ships wintering at the yards in a short time.

E. T. Douglass, general manager of the Western Transit Co. has been appointed manager of the Rutland Transit Line. This will not interfere with his present work as the Rutland line was recently acquired by the Western Transit Co.

The third annual ball of the Marine Engineers' Beneficial association of Ashtabula will be held in Haskell's hall in that city on Wednesday evening next.

Capt. George B. Mallory of Cleveland will bring out the new steamer Amasa Stone which is building at the Detroit yard of the American Ship Building Co. for Pickands, Mather & Co. of Cleveland.

DEATH OF MRS. ANNA C. MINCH

Mrs. Anna C. Minch, president of the Kinsman Transit Co., died at her home No. 80 Kinsman street, Cleveland, last week. She was the widow of Capt. Philip Minch who before his death in 1887 was one of the largest vessel owners on the lakes. Mrs. Minch was a remarkable woman in many ways. Notwithstanding her great age, for she was over eighty-six, she took great interest in her vessel property and had the business acumen to see the advantage in the giant class of carrier for a few months ago she placed an order with the American Ship Building Co. for one. Two years ago she christened the steamer Anna C. Minch at the Cleveland yard of the American Ship Building Co. named in her honor. Mrs. Minch was born in Germany and came to this country when she was sixteen years old. In 1841 she was married to Philip Minch, then a shoemaker at Vermillion, O. Philip Minch gradually worked his way into the vessel business until he finally owned one of the largest fleets on the lakes. He left his entire estate to his wife who immediately assumed the management of it. She directed its affairs from her home. In 1892 one of the steamers of her fleet, the Western Reserve, broke in two in lake Superior and her son, Capt. Minch, his wife, children, sister-in-law and her children were drowned. After this calamity the estate was divided into the Minch Transit Co. and the Nicholas Transit Co. She was vice president of the Minch Transit Co. and president of the Nicholas Transit Co. Four years ago she retired from active business life, retaining, however, the presidency of the Kinsman Transit Co. which was then organized. Mrs. Minch was the mother of eight children only one of whom is now living, Mrs. Henry Steinbrenner of 92 Kinsman street, Cleveland, O.

The funeral services, held at the residence at 1 o'clock on Monday last, were very impressive. Rev. J. H. C. Roentgen of the seventh reformed church and Rev. J. D. Jones of the floating bethel officiated. The remarks of Rev. Mr. Jones were especially sympathetic, touching and eloquent. He had known Mrs. Minch all his life and spoke with deep feeling and conviction of her many excellent qualities. The funeral was largely attended by vesselmen who had been associated in business with Mrs. Minch for nearly a score of years. The pallbearers were her grandsons, George H. Minch, P. J. Minch, G. M. Steinbrenner, C. P. Steinbrenner, P. H. Steinbrenner and J. H. Hassenflue. The interment was at Woodland cemetery.

The names of the two Gilchrist freighters building at the St. Clair yard of the Great Lakes Engineering Works were not decided upon this week in time to be included in the table of ships building on the great lakes published in this issue. They are however to be named after Col. Frank J. Hecker and George H. Russel, two of the most prominent citizens of Detroit.

The Great Lakes Towing Co. and the Licensed Tugmen's Protective association are now having a conference in Detroit but no business has as yet been accomplished. The executive committee of the Tug & Dredge Owners' Protective Association is also meeting the executive committee of the International Steam Shovel & Dredgemen to settle upon a schedule of wages for the year. Both these conferences will probably occupy the week.

The big steamer L. C. Waldo was cut in two at the plant of the Craig Ship Building Co., Toledo, O. last week for the purpose of being lengthened 72 ft. The forward part was placed on rollers and moved the desired distance in twenty-three minutes. As the material is on the ground it is expected that repairs upon her will be completed during the present month.

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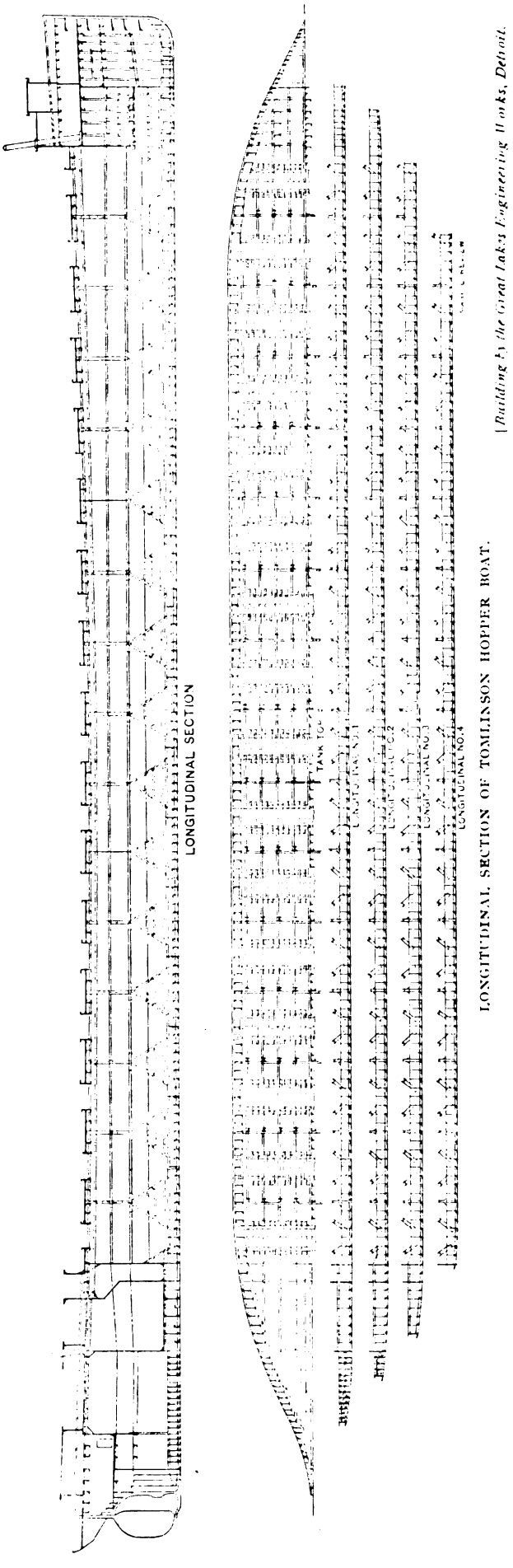

LONGITUDINAL SECTION OF TOMLINSON HOPPER BOAT.

[Building by the Great Lakes Engineering Works, Detroit.

THE TOMLINSON HOPPER BOTTOM STEAMER

The past year has noted many radical departures from the common form of ship construction on the great lakes. That the work of the ship builders on the lakes is being watched all over the world is evidenced by the fact that frequent inquiries are being made from Great Britain, Europe and even India for drawings of the longitudinal and midship sections. No two of the various companies which are building ships on the great lakes are building them quite alike. For instance, the Steel Corporation in its four giant freighters has not followed the Wolvin and Mr. Tomlinson in one of his ships building at the yard of the Great Lakes Engineering Works, Detroit, has made a radical departure from the Sahara. In fact, Mr. Tomlinson's ship is unlike anything that has ever been attempted on the great lakes. It has been noted for the past few years that both ship builders and ship owners have exhibited willingness and capacity to model their ships to meet the existing loading and unloading equipments on the docks. But no one has initiated such startling innovations to this end as has Mr. Tomlinson.

The accompanying drawings exhibit the design of his new ship very clearly. The new feature, which is unlike anything hitherto attempted, is a hopper bottom from which it is claimed ore can be discharged with a rapidity as yet unattained. The hoppers are so arranged that all the cargo will be trimmed into spaces only 6 ft. 9 in. wide, so that the clam shells will be enabled to clean out the vessel entirely without having to resort to any hand work. The claim is made that a 9,000-ton cargo of ore can be discharged from this vessel in 2½ hours. If this is so it will reduce the record time by one-half.

The new steamer is to be 524 ft. over all, 504 ft. keel, 54 ft. beam and 30 ft. deep. The deck is supported by the old style beams and not by the arch system of construction which has proved so popular during the past two years. The hatches are also of the old style spaced 24-ft. centers, but directly under each hatch is a hopper extending athwartship, the hopper being practically a girder fastened to the skin of the ship. Each hopper is 24 ft. wide at top, 6 ft. 9 in. wide at bottom and 13 ft. deep. The builders represent that the vessel is much stronger athwartship than anything of similar dimensions on the lakes. This is due to the fact that the weight of the cargo is transferred through the hopper sides directly to the shell of the vessel. There would, therefore, be not nearly so great a tendency for the bottom to sag as there is in vessels of the ordinary form of construction. This one feature covers about everything that is gained from a structural standpoint, the vessel being of the usual strength in a longitudinal direction. There will be no double sides, commonly known as the double hull. The water bottom will extend to the top of the inside of the hoppers. The new design has caused considerable discussion among vessel owners who are not a unit upon its advantages, believing that it is not as adaptable to all forms of trade, especially grain, as the ordinary design. The new steamer will have quadruple-expansion engines and Niclausse water tube boilers.

MEDIUM SIZE FAST PASSENGER STEAMER

The new steamer now being built for fast passenger service on northern Lake Michigan for the Escanaba & Gladstone Transportation Co. represents a type of boat well worth the careful consideration by any who expect to invest in a business of that character. The vessel has a finely modeled steel hull, 142 ft. long by 28 ft. beam, and will draw with ordinary load 11 ft. The hull is being built by the Manitowoc Dry Dock Co., Manitowoc, Wis. Her triple-expansion machinery embodies all the good practical features that long experience demonstrates is the best when actual worth rather than "first cost" is the prime consideration, it being designed and built by

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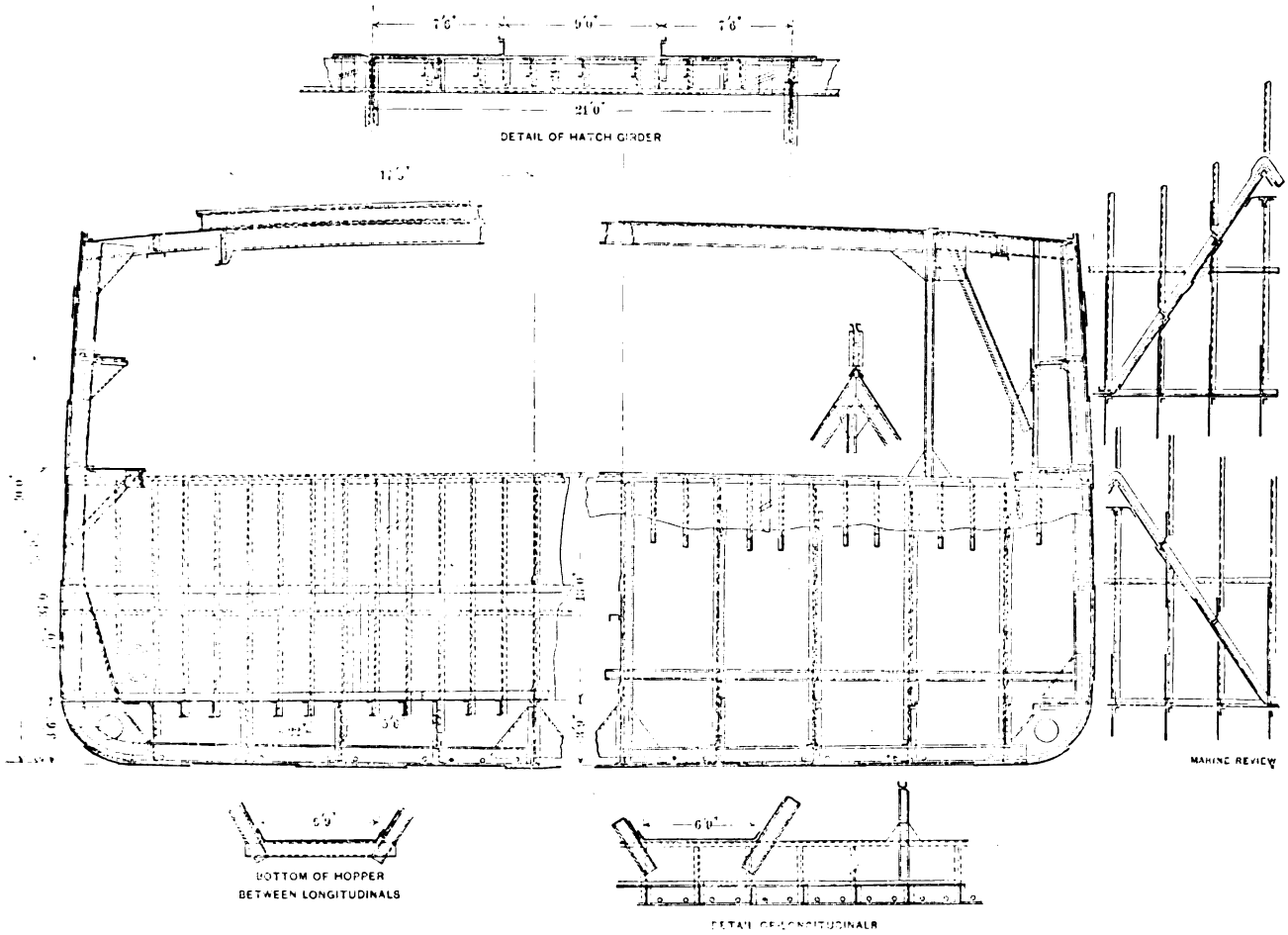

MIDSHIP SECTION OF TOMLINSON HOPPER BOAT.

[*Building by the Great Lakes Engineering Works, Detroit.*

the Marine Iron Works, Station A, Chicago. The engine cylinder diameters will be 14 and 22 and 36 in. by 24 in. stroke, fitted with steam reverse.

These modern quick-moving, medium-size dependable vessels on eight or twelve hour daily runs are far better "producers" than generally understood, and are gradually supplanting the old and slower moving combination freight, tug and passenger boats. Their first cost is necessarily greater, but generally the net results are in their favor before the close of even one season's business, as is usually the case with all first-class work.

HIGH-SPEED POWER BOAT

George W. Childs Drexel of Philadelphia, the owner of the sea-going steam yacht Alcedo, which he sent across the Atlantic last month, has placed a contract with the Gas Engine & Power Co. and Charles L. Seabury & Co. at Morris Heights, for a high-speed launch of the twin-screw type, fitted with two powerful gasoline engines, each having six cylinders. The speed guaranteed for the launch is 26 miles per hour. The hull will be 62 ft. over all. The stem has a moderate rake forward, and the stern, which is torpedo boat in plan, has nearly the same rake. There is good freeboard, with little sheer, and there is some depth of forefoot.

The hull will be built on an oak keel, with frames of bent oak. The planking will be double, and inner skin of white cedar laid fore and aft, with outer planking of teak. The plank sheers and the deck will be of mahogany. A very important feature of the hull will be the trussing for the entire length, there being a regular truss on each side of the main keel, amidship and at ends. This truss will brace the whole hull and transmits the strain of the machinery equally to all parts.

A novel feature will be the arrangement of the cockpits fore and aft with detachable spray hoods, which in calm weather are let down over the coaming, and when running in a choppy sea they can be removed and a portable or watertight covering is placed over the cockpits, protecting the machinery and steersman from flying spray. Mr. Drexel will use the boat on the coast of Maine, at his summer home, in the vicinity of Bar Harbor.

CHANGES AT NEWPORT NEWS

Newport News, Va., Feb. 2.—Important changes have been announced in the executive staff of the Newport News Ship Building & Dry Dock Co. consequent upon the appointment of Constructor H. L. Ferguson, United States navy, to the office of superintendent of hull construction. Gen. Supt. Post's title is changed to general manager. His assistant becomes assistant general manager. Superintendent of Hull Construction M. V. D. Doughty, who has successfully launched a great number of ships, becomes general superintendent of hull construction. Constructor Ferguson will resign from the navy at once. He was formerly assistant constructor, stationed at the ship yard, and is now on duty in Washington in the office of the bureau of construction and repair.

The ship yard last year broke all former records by docking 246 ships, including such leviathans as the Duetschland, Minnesota, Manchuria and others. It is said that over 400 vessels received repairs at the yard.

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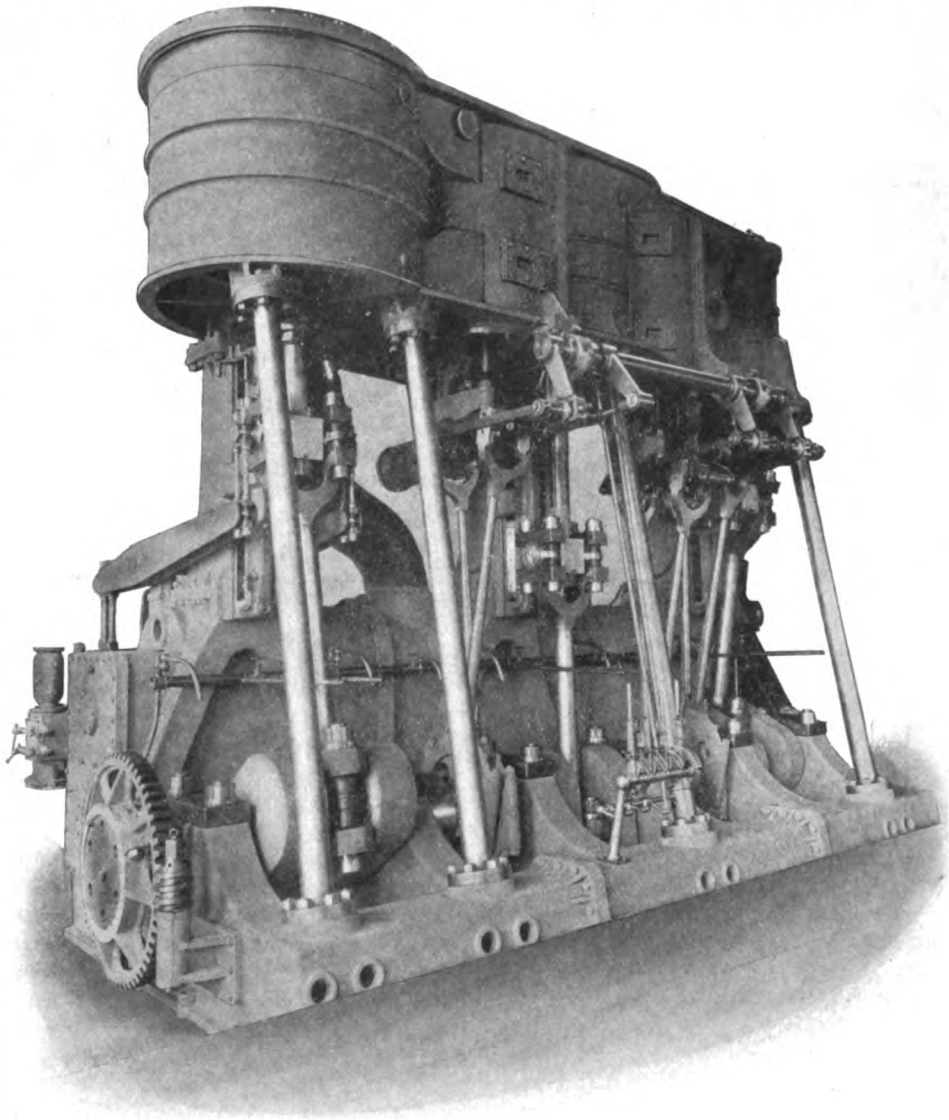
STEAMER ST. CROIX; DREDGE KEY WEST

While not actually builders of hulls, the Portland Co., Portland, Me., takes contracts to construct vessels completely, subletting the hull work to other builders and constructing the machinery themselves. The company has turned out much excellent products and is now engaged upon work which will undoubtedly give it much prominence. Among other things it is building is the arctic exploration ship with which Com'dr Perry will again endeavor to find the pole. The hull of the steamer is being built at the yard of McKay & Dix, Bucksport, Me., while the engines are being constructed by the Portland Co.

The steamer St. Croix, owned and operated by the Eastern Steamship Co. on their line from Boston, Mass., to Portland, Me., and St. John, N. B., represents one of the more pretentious of the Portland Co.'s contracts. The hull of wood was built by the New England Ship Building Co., Bath, Me. The machinery was built and installed by the Portland company. The general dimensions of the St. Croix are: Length 262 ft.; width 40 ft.; tonnage 2,000; speed 17 miles.



ENGINES OF THE STEAMER ST. CROIX

The propelling machinery consists of one fore and aft inverted, three-cylinder, triple-expansion engine of the open-frame, slipper-guide type, having cylinders 26, 40 and 67 in. diameter and 36 in. stroke, with turned steel front columns. The rear columns are of cast iron and made a part of the condenser shell. The bed is of cast iron of the box type made in three sections, the sections being bolted together by turned bolts. The condenser is of the surface type, having 3,102 sq. ft. of cooling surface. The shell as noted above is of cast iron and forms the rear support for the cylinders. Steam reversing gear is used, the steam cylinder for which is bolted to the middle rear column.

The valves are operated by the regular Stephenson double bar links, and consist of one piston valve for the high-pressure, two piston valves for the intermediate pressure and two piston valves for the low pressure. The crank shaft is of the built-up type of forged steel 12½ in. diameter in the bearings. The intermediate and tail shafts are of forged steel 13 in. diameter. All the shafts are fitted with couplings forged solid with the shaft and securely held together by turned bolts. A manganese bronze four-bladed sectional propeller 13 ft. diameter by 17 ft. pitch is fitted to the tail shaft.

The air pump is of bronze 28 in. diameter, operated from the low-pressure crosshead. The boat is fitted with a complete system of feed, sanitary and fire pumps, injectors, syphons and feed water heaters. The engine running under normal conditions with a boiler pressure of 170 lbs., 104 revolutions per minute, developed 2,300 I. H. P.

Steam for the main engine is supplied by four single-end, three furnace Scotch boilers 12 ft. 6 in. diameter and 12 ft. 1 in. long, each containing 242 3-in. tubes 8 ft. 6 in. long, having a total grate area of 248 sq. ft. and a total heating surface of 7,481 sq. ft., designed for a working pressure of 175 lbs. For operating the auxiliaries and heating system there is a donkey boiler of the single furnace Scotch type, 6 ft. 8 in. diameter and 10 ft. 2 in. long, containing 124 2¼ tubes 7 ft. long. The steamer is fitted with the Williamson steam steering gear and a complete electric light plant, including searchlight. At the time this vessel was constructed she had the largest boilers and engines ever built in New England.

Designs for all the dredges for the United States government are generally prepared by Maj. James C. Sanford, corps of engineers, with headquarters at Philadelphia. The Portland Co. has recently delivered a wooden dredge constructed upon designs furnished by Maj. Sanford. The dredge is of unusually strong construction and is 141 ft. over all, 130 ft. between perpendiculars, 31 ft. beam and 15 ft. deep. The keel is of oak, the frame is of hardwood and the deck beams and planking of Georgia pine. The dredge is propelled by a compound condensing engine with cylinders 17 and 32 in. diameter by 24 in. stroke, driving a cast iron propeller 7 ft. 8 in. diameter by 12 ft., with four blades. The engine is of the open-frame, slipper-guide type. The valves are operated by the Stephen-

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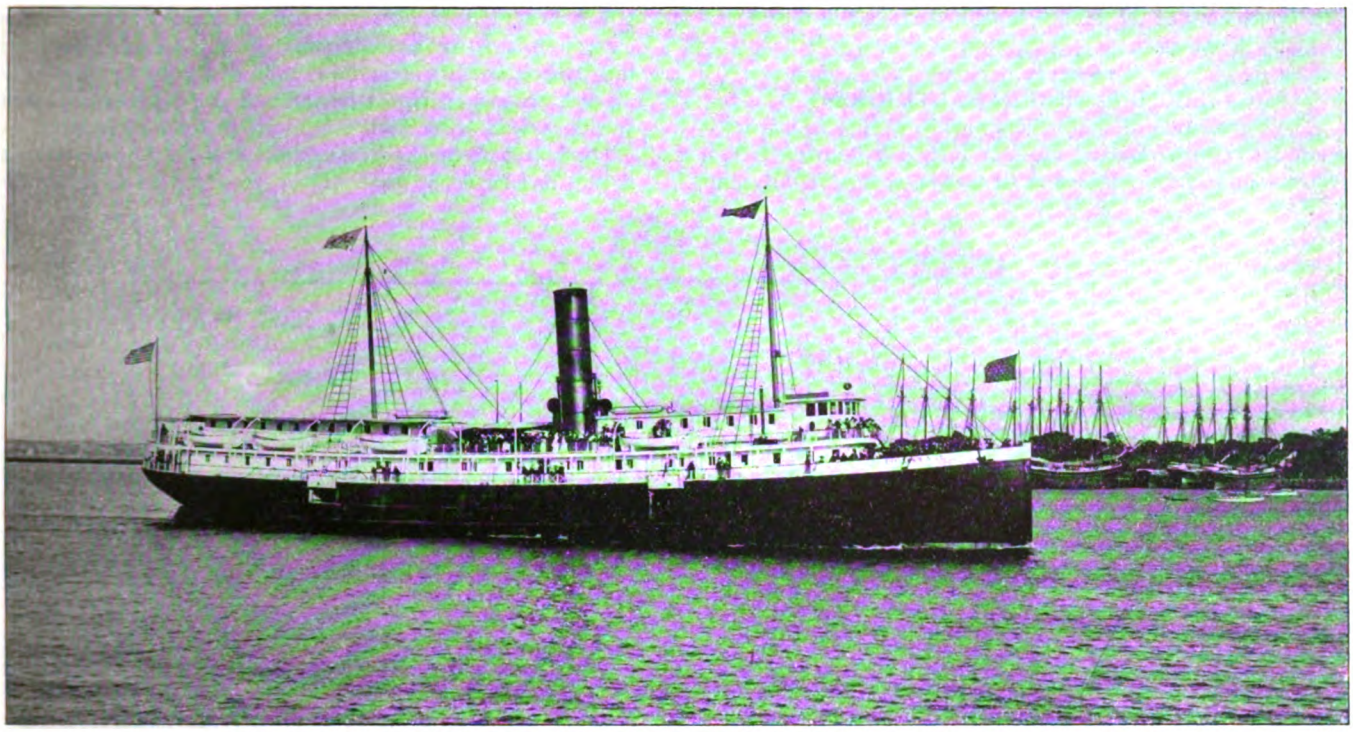
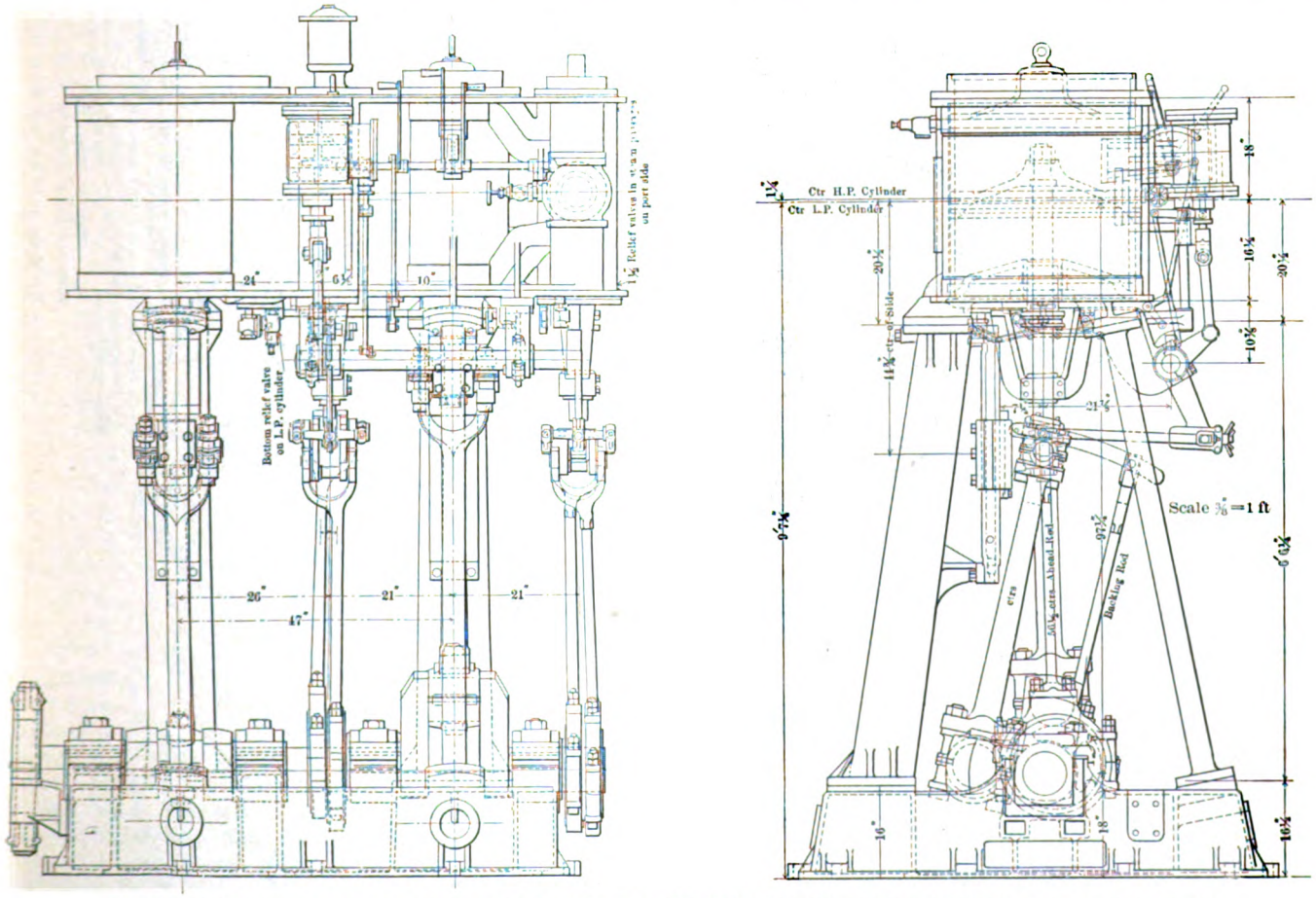


THE STEAMER ST. CROIX OF THE EASTERN STEAMSHIP CO.'S FLEET.

son double link motion and consist of a piston valve on the high pressure and a double-ported slide on the low pressure cylinder. Steam is supplied by a Scotch boiler, 13 ft. 6 in. diameter by 12 ft. long, fitted with three Morison furnaces. The heating surface is 2,925 sq. ft. and the total grate surface is 57 sq. ft. The 15 ft. 6 in. centrifugal pump is driven by a compound condensing engine with cylinders 12 and 22 in. by 14 in. stroke, capable of discharging 60 cu. yds. of water per minute against a total head of 14 ft. The dredge, which has been named Key West is to be used in harbor work.



SHOWING THE GENERAL ARRANGEMENT OF THE PROPELLING ENGINE OF THE SUCTION DREDGE KEY WEST.

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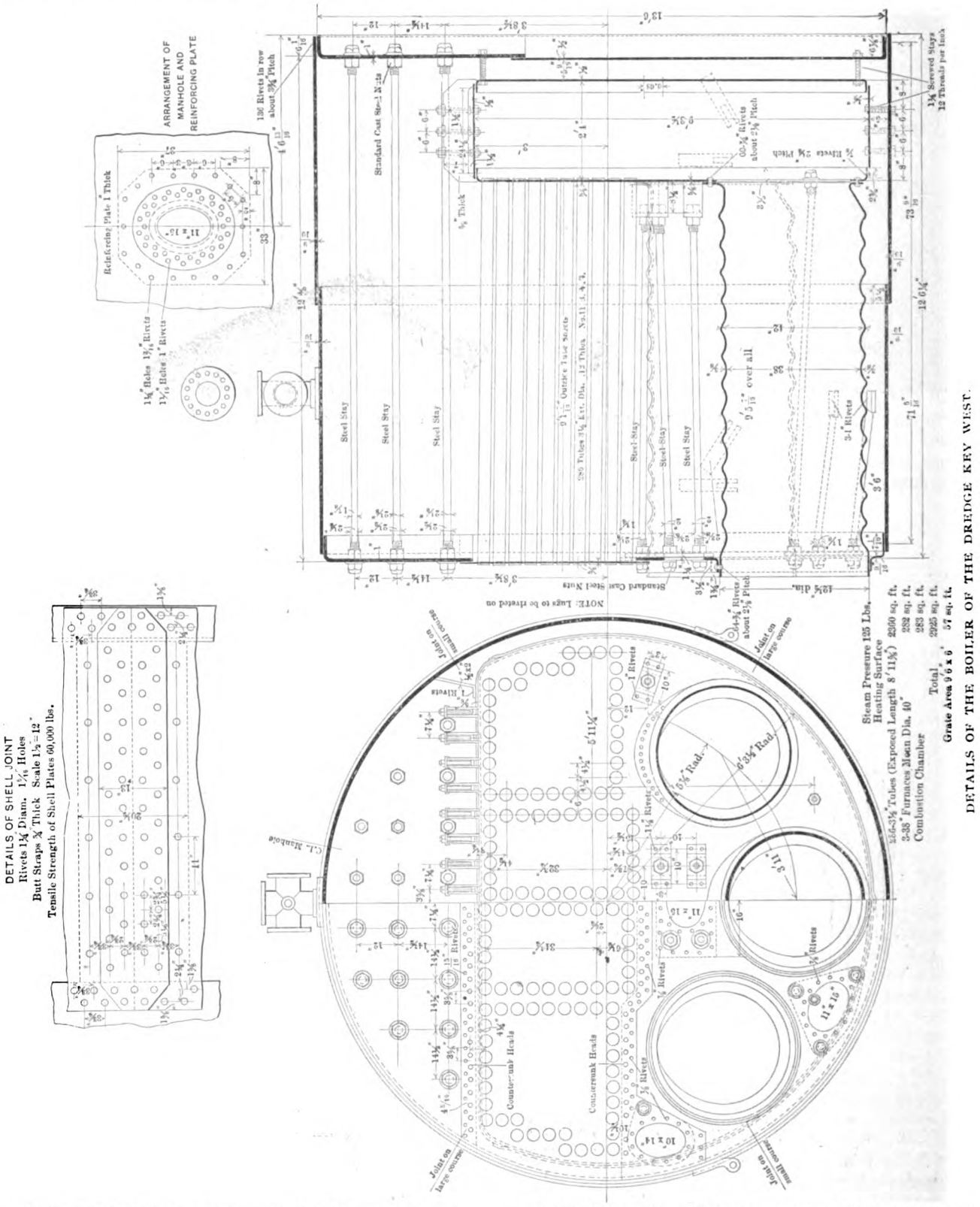
The machinery of the dredge is well illustrated in the accompanying drawings.

SHIP BUILDING IN BALTIMORE

The compilation of ship building in the Baltimore district is quite interesting. During the year forty-five ships were built of 21,003 gross tons, valued at $2,049,600, as against fifty-four ships in 1903 of 31,674 gross tons, valued at $3,200,000, representing a decrease in number of nine, in tonnage of 10,671, and in value of $1,150,400. The types built were as follows: Five steel suction dredges for the United States government; steel steamer for the United States revenue cutter service; steel passenger and freight steamer; two steel tugs; three wooden tugs; three railroad carfloats; one three-masted schooner; two steel oil-tank barges; three power yachts; twenty-three harbor lighters; one pile driver.

The Maryland Steel Co., Sparrow's Point, had an active year in the marine department. More vessels were launched in 1904, but their value fell $1,000,000 below that of the production of 1903, and the tonnage 6,166 less. Eight steel vessels were sent overboard during the year. Five of these were on United States government account. For the United States


ARRANGEMENT OF MANHOLE AND REINFORCING PLATE
Reinforcing Plate 1" Thick
Steel Stay
Standard Cast Steel Nuts
NOTE: Lugs to be riveted on
Steam Pressure 125 Lbs.
Heating Surface
256-3½" Tubes (Exposed Length 8' 11⅝") 2260 sq. ft.
3-38" Furnaces Mean Dia. 40" 282 sq. ft.
Combustion Chamber 283 sq. ft.
Total 2925 sq. ft.
Grate Area 9'6" x 6' 57 sq. ft.
Countersunk Heads
C.L. Manhole
Joint on large course
Joint on small course

DETAILS OF THE BOILER OF THE DREDGE KEY WEST.

DETAILS OF SHELL JOINT
Rivets 1¼" Diam. 1⅛ Holes
Butt Straps ⅜" Thick Scale 1½ = 12"
Tensile Strength of Shell Plates 60,000 lbs.

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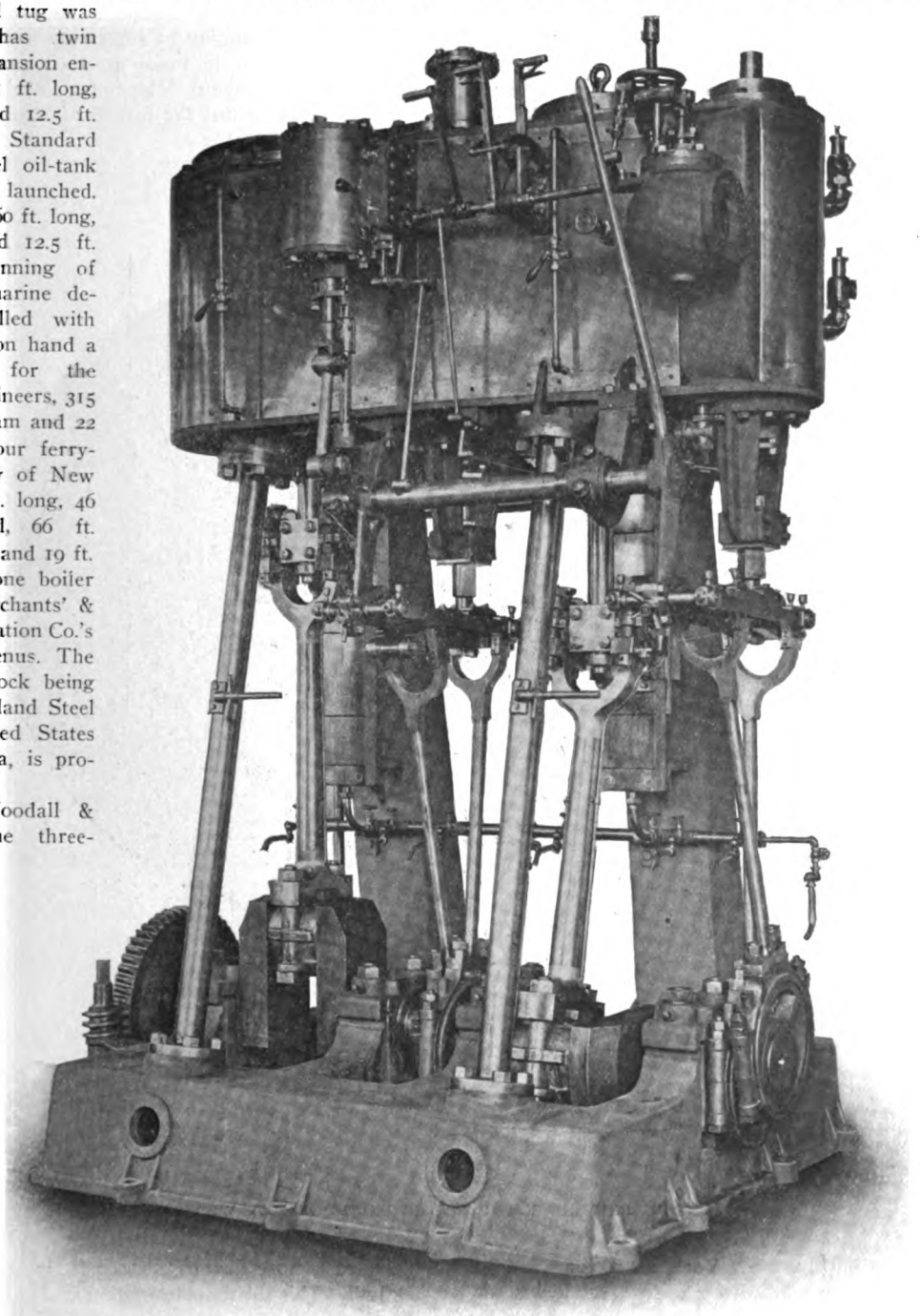
government there were launched the twin-screw, triple-expansion engine, suction dredges Manhattan, Atlantic and Burton, each 288 ft. long, 47.5 ft. beam and 25 ft. deep, and for the same corps the twin-screw, triple-expansion engine, suction dredges, General Gillespie and Savannah, each 177 ft. long, 38 ft. beam and 19 ft. deep. For the Pennsylvania Railroad Co. a steel tug was launched. It has twin screws, triple-expansion engines, and is 111 ft. long, 30.5 ft. beam and 12.5 ft. deep. For the Standard Oil Co. two steel oil-tank barges were launched. They were each 160 ft. long, 30.5 ft. beam and 12.5 ft. deep. The beginning of 1905 finds the marine department well filled with work. There is on hand a suction dredge for the United States engineers, 315 ft. long, 52 ft. beam and 22 ft. 6 in. deep; four ferryboats for the city of New York, each 250 ft. long, 46 ft. beam molded, 66 ft. beam over guards and 19 ft. 6 in. deep, and one boiler each for the Merchants' & Miners' Transportation Co.'s tugs Mary and Venus. The large steel dry dock being built by the Maryland Steel Co. for the United States for Cavite, Manila, is progressing.

William E. Woodall & Co. launched the three-masted schooner Charles A. Wittler, the first of her type sent overboard from a Baltimore shipyard for about five years. The Witler is 125 ft. long, 29.5 ft. beam and 8.5 ft. deep. Other vessels were one carfloat for the Southern Railway for Norfolk service, 135 ft. long, 32 ft. beam and 8 ft. deep, and two covered barges for the Chesapeake Steamship Co., 125 ft. long and 75 ft. long, respectively. The firm has under construction the hull of a tug for the James Clark Co., which is 110 ft. long, 21 ft. beam and 11 ft. deep, and an open lighter, 80 ft. long, 25 ft. beam and 7 ft. deep. Contracts are in hand for a 68-ft. tug for the Chesapeake Steamship Co. and a six-pocket mud scow for a local dredging concern. The James Clark Co. will engine the tug, to be launched in a few weeks, and machinery for the tug to be started is being built by the E. J. Codd Co.



COMPOUND ENGINE OF THE DREDGE KEY WEST.

The steel passenger and freight propeller Anne Arundel was launched for the Weems Transportation Co. by the Baltimore Ship Building & Dry Dock Co. Her dimensions are 186 ft. long, 40 ft. beam and 11 ft. depth of hold. The steel tug George F. Randolph, built to the order of the Baltimore & Ohio Railroad for service in New York, was also launched. The Randolph is 120 ft. long, 23 ft. beam and 12 ft. 6 in. deep. In addition to the above, the company built the engines for the tugs Margaret and Marion Cameron, converted the steamers Reading and Harrisburg into barges and the barge Bristol into a twin-screw steamer.

Thomas McCosker & Co. built the tug Margaret for the P. Dougherty Co., 117 ft. long, 23 ft. beam and 13 ft. deep; tug Hunter for the James Clark Co., 75 ft. long, 18 ft. beam and 8 ft. 5 in. deep; tug Leader for Philip Weaver & Son, 98 ft. long, 20.5 ft. beam and 9 ft. deep. These builders have a new tug on the stocks for Philip Weaver & Son. It is 105 ft. long. The William Skinner Ship Building & Dry Dock Co. sent overboard two carfloats for the Baltimore & Ohio Railroad service in New York, each 285 ft. long, 36 ft. beam and 9.5 ft. deep; two open lighters for the Chesapeake Towing & Lightering Co., each 90 ft. long, 26 ft. beam and 8 ft. deep; one pile driver for the Baltimore & Ohio Railroad, 50 ft. long, 22.5 ft. beam and 4 ft. deep.

Charles Rohde & Son beat their record for lighter building, having launched seventeen during the year. For the S. M.

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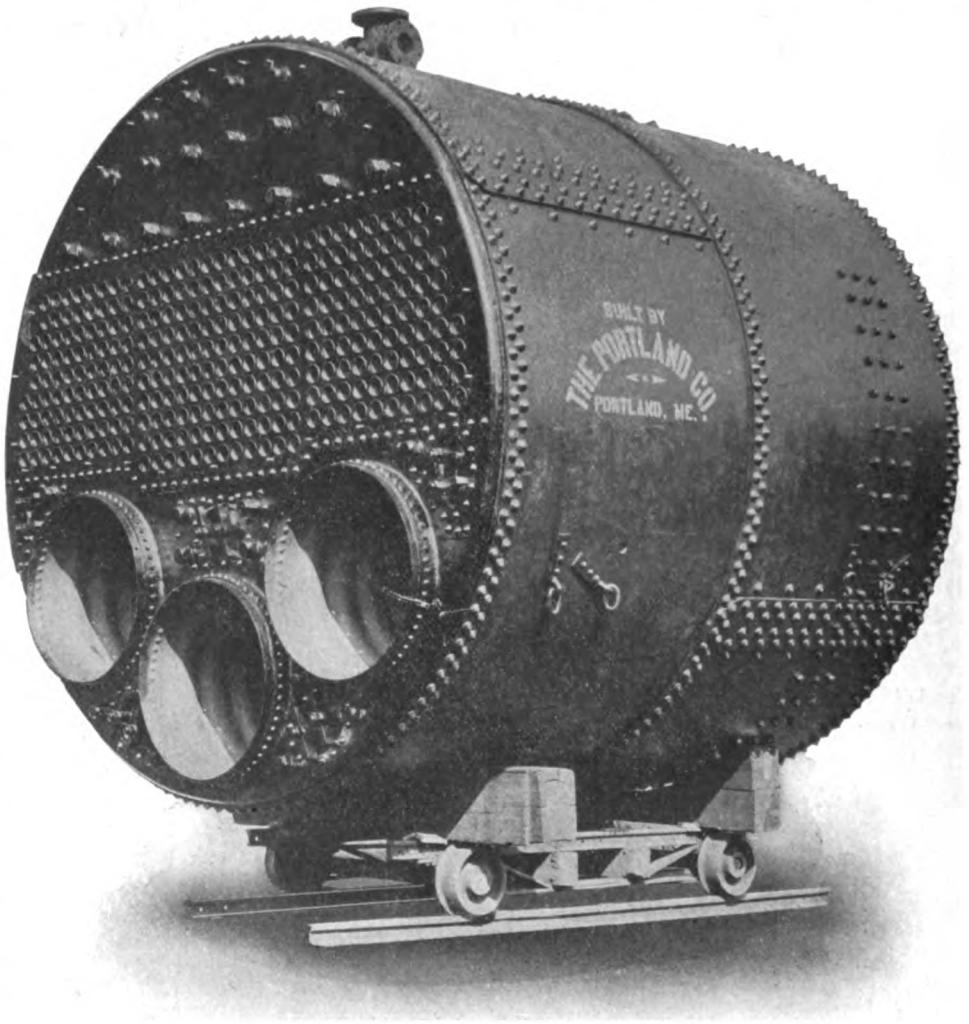
Hamilton Coal Co. were built two open lighters, each 92 ft. long; for M. W. Adams, two 85 ft. long and one 92 ft. long, all open; one, 75 ft. long, open, for the S. M. Johnson Coal Co.; two 85 ft. long, open, and three, 80 ft. covered, for the Maryland Transportation Co.; four open and 85 ft. long, for Richardson & Ross of Philadelphia; one covered and 90 ft. long, for the Imperial Co. of Norfolk, Va.; one open and 80 ft. long, for the Baltimore Copper Works. The year begins with an order for the hull for a wrecking machine for the Baltimore Wrecking Co. It will be 87 ft. long, 30 ft. beam and 11 ft. deep, and is to have a double-A frame and double set of booms, which will enable the machines to work in any position. Capt. Henry Broom, president of the company, will have the machinery installed as soon as the hull is overboard.

The Spedden Ship Building Co. launched and delivered the United States steel revenue cutter Wissahickon for customs harbor service at Philadelphia. The Wissahickon is 96.5 ft. long, 20.5 ft. beam and 10 ft. 3 in. depth of hold.

The Nilson Yacht Building Co. sent overboard three pleasure craft. They were the power houseboat Reliance, 66 ft. long and 16.5 ft. beam; power yacht Vide, for Mr. A. C. Smith of New York, 42 ft. long and 10 ft. beam, and the power yacht Idlehour, for Mr. Lewis M. Keizer of Baltimore. A large number of fancy boats, launches and pulling boats were built by this firm, including an order for whaleboats from Brazil, the coast survey and the lighthouse service. There are now on the stocks a 65-footer and a 45-footer, both to be of the power type of pleasure boat. They will be launched in time for next year's yachting season.

Booz Bros. launched two covered lighters for the Maryland Transportation Co., each 85 ft. long.



SCOTCH BOILER OF THE SUCTION DREDGE KEY WEST.

LUMBER TRADE OF THE NORTHWEST

Duluth, Feb. 6.—Few people appreciate the rapidity with which the white pine timber of Minnesota is being cut off. The official reports for 1904 show a cut for the state amounting to more than 2,000,000,000 ft. This was distributed as follows: Duluth district, including the northeastern part of the state, and grouped naturally on account of the fact that its chief market and selling point is the east—New York, New England and Ohio points, 1,018,000,000 ft; Mississippi river points above Minneapolis, 544,000,000 ft.; Minneapolis 387,000,000 ft. This all makes a total of 1,950,000,000 ft., but to it must be added the cut of mills on the Mississippi river below Minneapolis, amounting to 385,000,000 more. All these mills, most of which are in Iowa, get their stock from the upper river, that is northern Minnesota. Their product is to be counted on as against the forests of Minnesota or any other.

Estimates for the standing pine of Minnesota vary from ten to thirty billion feet, a pretty wide variation, but in any case quite too close to the annual production to be comfortable.

The production of the Duluth district puts it ahead of any pine region in the United States. It is divided between mills in the city of Duluth, and at surrounding suburbs, and at points from fifty to seventy-five miles away, where there may be a mill or two, located to saw some special tract of timber. The great market for the Duluth district is the cargo trade to the east, and last year there passed through the Sault canal, going east, more than 925,000,000 ft., most of which came from Duluth. This all went by water, at an average rate of nearly $2.50 per 1,000 ft., and 25 cents more for inspection, etc. This billion feet of lumber was worth, on docks at the head of the lake, about $15,000,000.

The lake shipping trade, and the lumber consuming sections of the east, are vitally interested in the maintainance of this business, and will suffer materially when it is through, as it must be in a comparatively few years. It is very evident that the agitators for forest preservation and of reforestation, are not working a bit too fast nor too hard. The need of this work is now abundantly seen.

Chief among the destroyers of northern Minnesota pine are the various companies in what has been known as the Weyerhaeueser syndicate. They have many mills throughout the district, five at the small milling village of Cloquet, 15 miles

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from Duluth. They have thousands of miles of timber lands that are being cut off very fast. So far, contrary to the plan of most lumber companies, they have refused to sell any of these lands for settlement. They are now preparing a plan for reforestation, under the direction of the bureau of forestry, and will soon decide whether to sell their lands or keep them and endeavor to have continuous pine forests. No other lumbermen in this part of the west are so well able to do this, for none have such large tracts of land, and none are financially, so heavy. Millions of acres, mostly in St. Louis and Itasca counties, will probably be maintained as forest reserve by the Weyerhaeuesers. This will tend to permanently maintain the supply of timber available for eastern consumers at a high pitch.

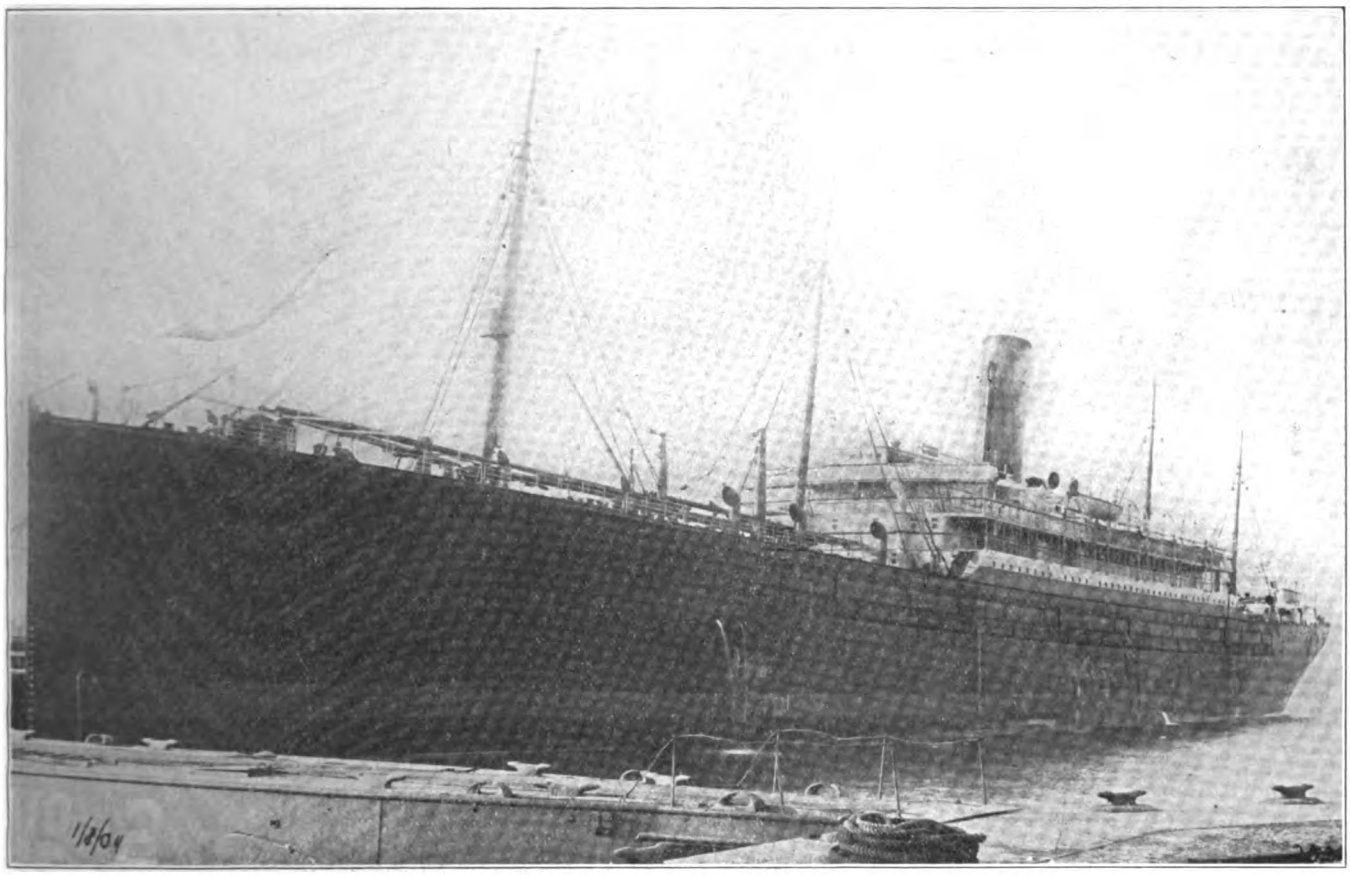
With the opening of navigation this season every stick of lumber on docks at the various points about Lake Superior, will have been sold and ready for shipment. There will be, notwithstanding, a less volume of stock for shipment east than for many years, so clean did the buyers of last fall carry off the dry stock then on hand.

J. C. Beetle, the boat builder of Alameda, Cal., has just finished for W. T. White of San Francisco a launch named Anemone. She is 41 ft. long, has a beam of 8 ft, and a draught of 3 ft. 4 in. Her outside woodwork is of teak, and her cabin of mahogany. She is equipped with a Standard gas engine of 25 H. P. and is lighted by electricity. She is of the torpedo boat model.

The North Pacific Steamship Co. has inaugurated a new line of steamers between Portland and San Francisco with the steamship Roanoke. Two additional steamers are to be added to the route as soon as they arrive from New York. Charles P. Doe & Co. are the general agents at Seattle.

NEW YORK SHIP BUILDING COMPANY

During the past year no changes of any special importance were made at the plant of the New York Ship Building Co. at Camden, N. J. with the exception that the company added a very large blacksmith shop to its equipment. The company delivered during the year the fireboat George B. McClellan built for the city of New York from designs by Tams, Le moine & Crane. This fireboat probably represents the latest design in this class of vessel. On another page will be found a picture of lightship No. 80 of which five have been built by this company for the lighthouse establishment. The Manchuria and Mongolia, which the company built for the Pacific Mail Steamship Co. have now been in commission for nearly a year and are working very satisfactory. The accompanying photograph of the Mongolia gives a fair idea of the great size of this vessel. They are 616 ft. over all, 65 ft. beam, 51 ft. 3 in. deep and are fitted with four cylinder quadruple-expansion engines with 11,000 H. P.



THE PACIFIC MAIL LINER MONGOLIA.

[Built by the New York Ship Building Co., Camden, N. J.

Mr. J. H. Sheadle of the Cleveland Cliffs Iron Co. has appointed the following masters for the vessels of which he is manager: Steamers—William G. Mather, Capt. J. M. Johnston; Peter White, Capt. Samuel N. Murphy; Presque Isle, Capt. H. H. Parsons; Angeline, Capt. S. A. Lyons; Centurian, Capt. C. E. Sayre; Pontiac, Capt. T. E. Murray; Frontenac, Capt Charles A. Anderson; Cadillac, Capt. W. M. Hoffman; Pioneer, Capt. C. R. Ney; Choctaw, Capt. F. D. Perew; Andaste, Capt. U. S. Cody; Kaliyuga, Capt. Fred D. Fonuin; Falcon, Capt. E. W. Bennett; schooner Chattanooga, Capt. Thomas Kimmett.

The Camden Anchor Rockland Machine Co., Rockland, Me., is doing a great volume of business in power launches.

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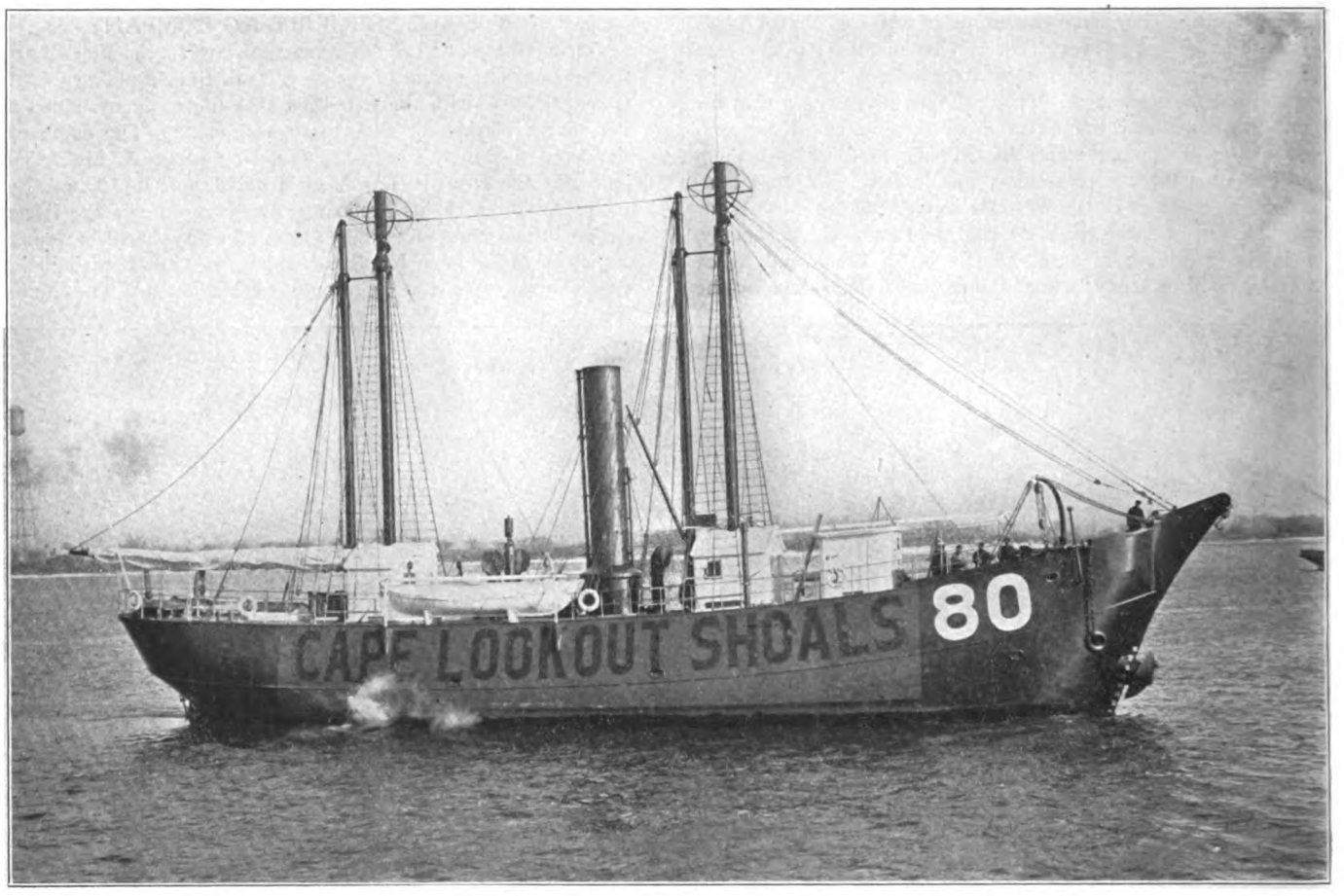

LIGHTSHIP FOR CAPE LOOKOUT SHOALS.
[*Built by the New York Ship Building Co., Camden, N. J.*

LIGHTSHIP No. 80

To live at one end of a fretting cable with a 2-ton anchor at the other end, to see nothing but the everlasting sweep of sea and sky, to hear nothing but the shriek of the wind and the moan of the wave, to eat and sleep in a reeling, staggering, tossing vessel, rolling beyond the angle of imagination, such is life in No. 80, one of five lightships just completed for the United States government by the New York Ship Building Co., Camden, N. J. One of these ships is to go around the horn and while those who journey in these dripping, pitching, tumbling craft give up everything save hope there is no dearth of applications for service. No. 80, like her four sisters, is 114 ft. long, 28 ft. 6 in. beam and 20 ft. 10 in. deep. Her draught is 12 ft. and her tonnage 450. All have towering freeboards to meet the heavy head seas. The vessels are ponderously built to cope with the force of the elements for lightships are anchored, not in lily ponds, but where they will have to meet the merciless fury of the ocean. As they are not infrequently torn from their moorings they are supplied with 10-knot engines to keep them off a lee shore, and to ease the strain on the cable if need be. The engines are compound, cylinders 16 and 31 in. diameter by stroke of 24 in., supplied with steam from two gunboat boilers.

The lighthouse establishment expresses no concern over the seaworthiness of these craft. They can be made quite tight from the waist down and are capable of being corked up like a bottle. The only aperture through which the sea could possibly enter is the funnel and while the degree of stability incorporates such a roll it is naturally hoped that this opening will not be used to scoop up water.

NATIONAL MOTOR BOAT EXHIBITION

Not to be outdone by any foreign country the management of the first national motor boat exhibition, which will open in Madison square garden, New York city, on Feb. 21, in conjunction with the sportsman's show, has arranged to have the affair opened by either President Roosevelt or his personal representative. Never before, outside of naval functions, has there been anything which will compare with the demonstration at this opening, as aside from the naval officials there will be present commodores of all the leading yacht clubs in the United States.

The largest indoor lagoon ever known in this country will occupy the centre of the garden, and motor boats will whirl around the twelve-lap course, while spectators view them from outside, and from the island in the center, which will be reached by rustic bridges from the mainland. The sportsman's show has ever been a favored event at the garden, and with its guides, trappers, water sports, combined with the motor boats, the eleventh exhibition should surpass all former ones. The show interests the lover of outdoor sports, whether he be a hunter, fisherman, canoeist, yachtsman, or motor boat enthusiast.

The Manitowoc Dry Dock Co., Manitowoc, Wis., is building a steel dredge for Edward Bros., Sault Ste. Marie, Mich., of the following dimensions: Length, 116 ft.; beam, 40 ft.; depth, 13 ft. The engine is to be built by Jackson & Church, Saginaw, Mich., the boiler by the Manitowoc Steam Boiler Works, Manitowoc, Wis., and the dipper and forward end of the dredge by the Bucyrus company, South Milwaukee, Wis.

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GENERAL VIEW OF MARE ISLAND NAVY YARD.

MARE ISLAND NAVY YARD

The famous Mare Island navy yard lies between San Pablo bay, the strait of Carquinez, and a narrow channel that opens out into the latter strait. The island proper is about five miles long, and averages about one mile in width. The island is located about thirty miles from San Francisco. Though Mare island contains many thousands of acres, only comparatively a few hundred acres are actually occupied by the many great shops, foundries, dry dock, etc., and the residences of the officers, commissary stores, general supply depots, and quarters, barracks, etc., for the marines. This settled part is near the southeastern end of the long narrow island. All the vast government plant is located along the eastern shores of the narrow channel opening into Carquinez strait. Directly across the channel, on the mainland, stands the lively little city of Vallejo.

Mare Island navy yard was established, in a small way, more than half a century ago. Commodore Sloat selected the island as a future navy yard on Oct. 8, 1852—fifty-two years ago. However, the yard has steadily expanded, until now it is among the very largest in the United States. In equipments and facilities, the Mare Island navy yard is second only to the one at New York, while Norfolk, Portsmouth, Philadelphia, Pensacola, New Orleans and Brementon, on Puget sound, are smaller. The operating plants, powerful machinery, massive gearing and steel tackling, ponderous cranes, appliances and great machine shops are very complete, and are as capable of doing as heavy and as good work as any other government ship yard in the United States. To accomplish this, heavy appropriations have been made by the government from time to time. Almost every year extensive improvements and facilities have been added. Buildings have been erected until now there are more than forty, most of these buildings are of immense dimensions, and are constructed of brick, stone and steel. So complete and extensive are the facilities that any sort of work in the line of naval construction and repairs can be done very rapidly. War craft of any magnitude can be built as well at the Mare Island navy yard as any other place.

Several very large brick structures have just been completed. One of these is a building at which guns are to be cast and repaired. These guns will, of course, not be of large caliber—ranging from 6-in. bore and downward. Another immense building will be used as a boat house in which large vessels will be constructed.

Many years ago a large stone and concrete dry dock was built at these yards, and has been used continuously. This basin is 526 ft. long over all, 122 ft. wide at the top, and 21 ft. over the sill at extreme low tide. However, this dock is not of sufficient capacity to accommodate all the largest war vessels, and a new and much larger dock is now in course of construction. This new dock will be one of the largest in the world—being 750 ft. long inside the basin, 122 ft. wide at the top, and 72 ft. wide at the bottom, and nearly 30 ft. over the sill at extreme low water. It will be 800 ft. in length over all. The total cost to the government of this dry dock will be about $1,150,000. A year or more will be required to complete this huge basin. It will have ample capacity to accommodate the largest war vessels in the world.

When the various vessels belonging to the Pacific squadron are not on crushing duty, they make Mare Island navy yard a general rendezvous, and often fifteen or twenty war craft may be seen moored along side the piers, or lying at anchor. San Pablo bay is used as a general maneuvering grounds for testing speed, and for target practice—especially for smaller calibered guns. Rear-Admiral McCalla is in command of the Mare Island navy yard.

STEAMSHIP ASSOCIATION OF SAN FRANCISCO

Articles of incorporation have been filed by the Steamship Association of San Francisco, its objects being to promote and protect all interests connected with American shipping on the Pacific coast; to maintain general headquarters; to provide means for the just, fair, convenient and economic employment of seamen, engineers and others, and to advocate legislation for the improvement of the industry. The capital stock of the Steamship association is $100,000, the incorporators being Robert Dollar, W. G. Tibbetts, E. A. Christenson, George D. Gray, J. R. Hanify, C. R. Johnson and Robert H. Swayne. All the above except C. R. Johnson, who resides at Fort Bragg, are residents of San Francisco or neighboring towns.

The steamship Minnesota, built by the Eastern Ship Building Co., New London, Conn., for the Great Northern Steamship Co., Seattle, Wash., has just left Seattle with the largest cargo ever carried across the Pacific and probably in the world. It comprises 26,000 tons of freight made up of cotton, structure iron and steel, machinery and seventy-five flat cars.

The house committee on naval affairs has decided to incorporate in the naval appropriation bill provision for the construction of two new battleships. They will be of 16,000 tons each, representing the largest type and carrying the largest armor and armament.

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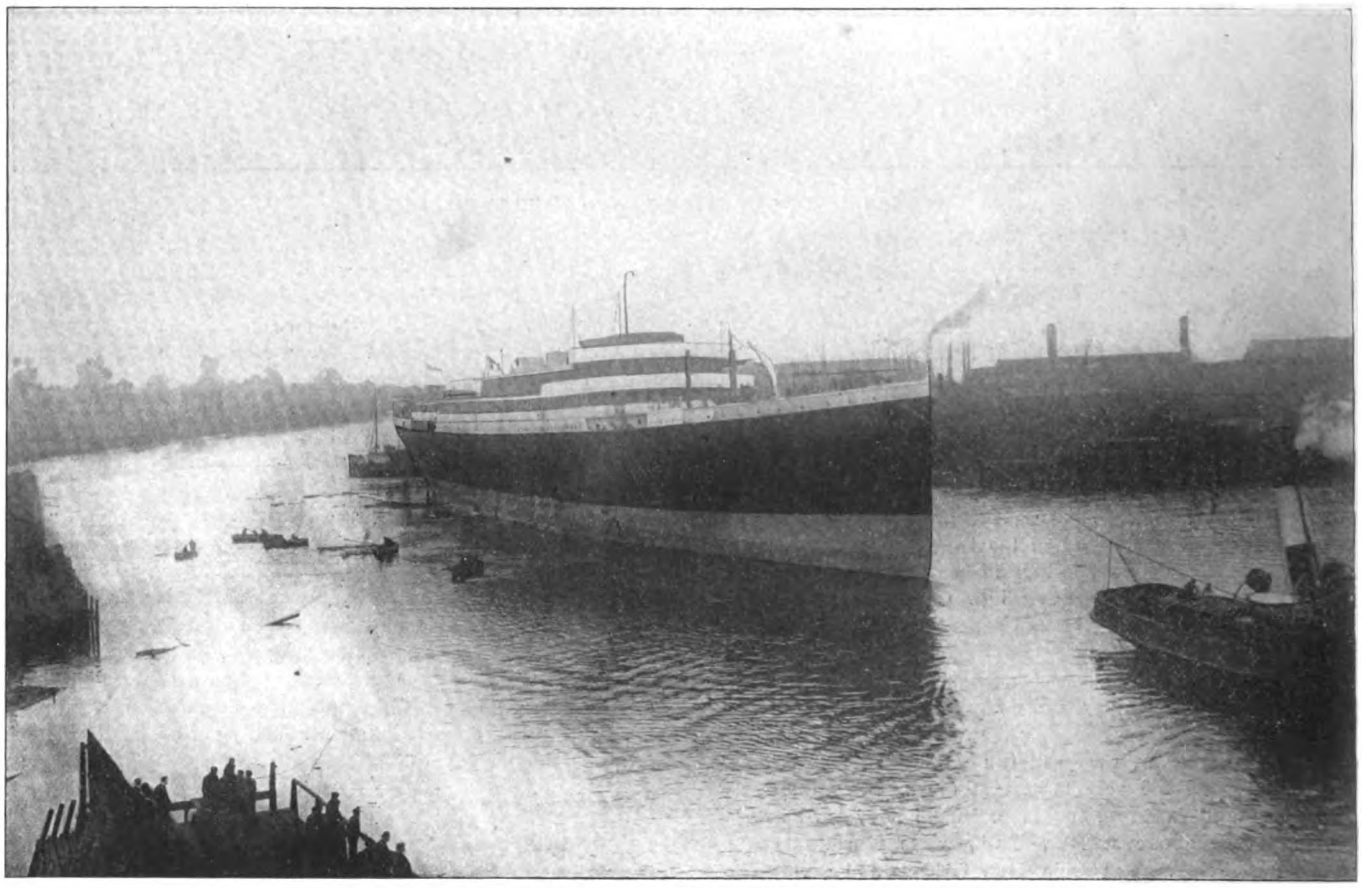
LAUNCH OF TURBINE STEAMER VIRGINIAN

On Dec. 22 Messrs. Alexander Stephen & Sons, Ltd., launched at Linthouse, on the Clyde, the new turbine steamer Virginian of 11,200 tons built for the Allan Line Steamship Co. of Liverpool and Glasgow. The launch of this vessel marks further advance in the progress of the steam turbine as applied to ocean steamers and Messrs. Allan must be congratulated on their enterprise in installing this method of propulsion in a vessel of the size and type of the Virginian, which with her sister ship the Victorian now completing at Belfast, will be the first turbine liners to cross the Atlantic. Like the Tunisian of 1900, the Virginian of 1904 is larger, faster, and in every respect an improvement on anything yet built for the Allan Line. The Virginian's dimensions



LAUNCH OF THE ALLAN LINER VIRGINIAN.

are: 540 ft. length over all, 60 ft. beam and 41 ft. depth. She has been constructed under the supervision of Messrs. Allan's representatives, Mr. A. M. Gordon and Mr. David Johnston, to the highest class in the British corporation, and to the passenger requirements of both the British Board of Trade and the American laws. She has accommodation for about 1,650 passengers, 470 first-class, 240 second-class, and 940 third-class. The boats are more than sufficient to accommodate her full complement of passengers, and a number of the boats are fitted with patent quick lowering apparatus. The vessel is specially designed for the conveyance of the Canadian mails and passengers; no fewer than five decks are fitted for the accommodation of the latter. In the passenger space, the first-class which is amidships, has naturally the finest accommodation in the matter of sitting rooms and saloons, but in the staterooms, it is difficult to distinguish between the first and second, the fittings being equally good, and much of the accommodation being arranged so as to be available for either class, according to the particular requirements of a voyage. Several of the best rooms on the bridge are arranged so that they may be let in suites, comprising private sitting-rooms, bedrooms, and private bathrooms. The first-class dining-saloon at the fore-end of the bridge, is arranged on the modern group system of small tables, each seated for parties of six or eight, and has accommodation for 200 persons. The music-room, like the dining-saloon, is treated in the Georgian style, but finished in lightly stained mahogany below and ivory white above, with richly figured brocade panels, the upholstery being made to harmonize. The library has a simple treatment in oak—the dado primed oak and the upper part white enameled, with brocade panels. The decoration of the smoking room is carried out in primed oak treated in a classic manner, with panels of inlaz and artistic carvings. In addition to the above accommodation for the adult passengers, Messrs. Allan have provided for their youthful clients in the shape of a large and airy nursery, which will doubtless prove a boon both to parents and the other passengers. The second saloon on the main deck is arranged to seat over 200 passengers, is well lighted in a similar manner to the first saloon, and is decorated in a very pleasing manner. The stewards' and cooks' departments have been kept quite separate from the passenger accommodation. Every provision has been made for the severe weather sometimes experienced on the Atlantic, and the cabin accommodation is heated throughout by steam, the pipes being so arranged that each individual passenger can modify the heat to suit himself. The Virginian is lighted throughout by electricity, and has a complete system of electric bells and also electric fans, but a more modern invention fitted on board is the Marconi telegraph installation, enabling messages to be exchanged with telegraph stations on the coast, thus maintaining communication with land during the greater portion of a Canadian voyage. The turbines, which are to be supplied by the Parsons' Marine Steam Turbine Co., Ltd., are expected to prove of ample power to drive the vessel at a high rate of speed, although the space they occupy is considerably less than would have been required by reciprocating engines of equal power.

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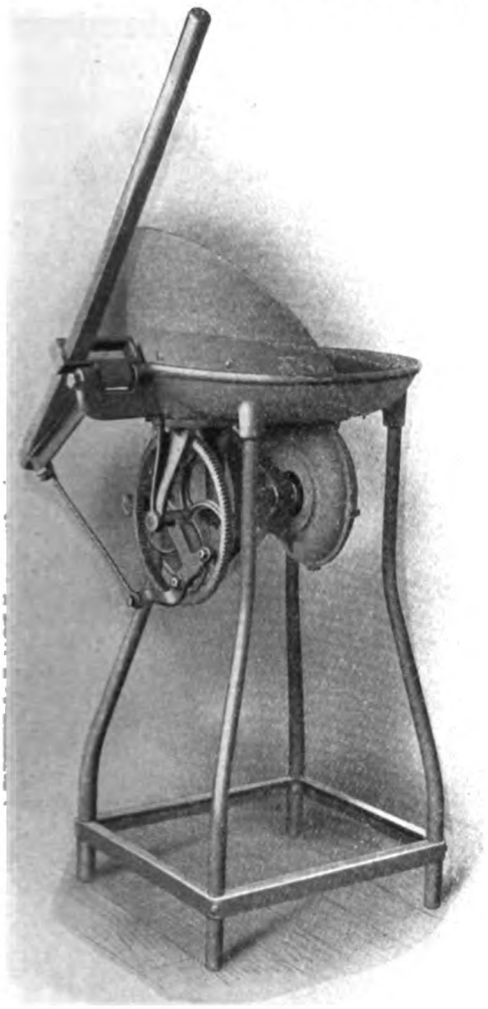
THE STURTEVANT PORTABLE FORGES

The adaptability of the Sturtevant portable forges to all light forge work, their endurance and ease of running, have for many years given them the preference with blacksmiths, wagon and carriage smiths, tool makers, locksmiths, tinsmiths, jewelers, prospectors and miners, bridge and tank builders, sheet iron workers and riveters in general. In shops and mills, on ship board, in manual training schools and mechanical laboratories of technical schools, they meet alike the requirements of a small and medium sized forge for heating and tempering and for small repairs.

These forges have stood the test for years not only in this country but abroad. From time to time new sizes have been



A-1 FORGE.

added to the list to meet new applications and conditions and now, with no less than thirty-one sizes, the applications may be widely variable. Not only have new sizes been made but the designs have been perfected in every little detail. The sheet metal work is of heavy steel plate, the running gear is heavy, strong and easy of operation. The tuyeres are made extra strong to resist the action of the fire and the fire pan is of a double metal plate with asbestos between to prevent the heat from cracking the main pan or affecting the running gear. The blower is of the well known Sturtevant steel pressure type, has babbitted journal boxes and has been redesigned to give increased capacity.

There are seven distinct types represented respectively by the A, B, C, D, E, F and G forges. Types A, B and C are alike except in the means of producing the blast. The blast for the type A forge is provided by an attached blower driven by hand power. The B forges are arranged for pipe connection and receive blast from an independent blower, which may also supply a number of forges. Forges of the C type are fitted with a blower driven by a pulley on the forge, belt connected to a line shaft or other drive.

The A forge is built in five sizes adaptable to all light work, and is extensively used by wagon and carriage smiths, tool makers and blacksmiths. On the farm and plantation, in the shop and mill, on ship board and in manual training schools, or wherever small repairs are necessary, this forge is much demanded. Sizes A-1, A-2 and A-3 differ only in the hoods. The A-1 is provided with a wind-guard, A-2 has an open hood and A-3 a closed hood. Sizes A-4, A-5, A-6 and A-7 have larger pans and are provided with a water tank. A-8 is heavier in construction, has a Sturtevant hand blower attached for supplying the blast and is used extensively for stationary work.

The B type is made in eight sizes particularly adaptable to mechanical laboratories of technical schools. As before stated, they are similar to the corresponding numbers of the A forges except in the manner of producing the blast.

The C forges are made in four sizes, C-4, C-5 and C-6 and C-7 corresponding to forges A-4, A-5, A-6 and A-7 and are fitted with a tight and loose pulley for belt connections; a continuous blast may be thus provided which can readily be regulated by means of a blast gate underneath the fire pan.

For the lightest forge work, forges D-1, D-2, D-3, E-1, E-2 and E-3 are peculiarly suitable. Sizes D-1, D-2 and D-3 are like A-1, A-2 and A-3 but have shorter legs for bench work, and are arranged for blast connection to an independent blower. The pan, tuyere and blower of the E-1, E-2 and E-3 forges are exactly similar to but smaller than those on the A-1, A-2 and A-3 forges, but the hand power attachment is arranged for bench work. With these forges a strong wooden box is furnished sufficiently large to hold a complement of tools together with the forge itself. The equipment is, therefore, extensively used by repair and set-up men on account of its ease and convenience of transportation. As in the A forges, the three sizes differ only in the hoods. E-1, like A-1, is provided with a wind-guard only, E-2 has an open front hood and E-3 a closed hood. For the light work of jewelers, locksmiths, tinsmiths, and farmers and for all small repairs this type of forge is best adapted.

The F forge is made in three sizes, F-1, F-2 and F-3, exactly like the A-1, A-2 and A-3 forges except that they have much shorter legs; in fact, they are short enough to give the correct height for operation when the forge sets on the box. This type meets the requirements of the prospector and miner, but is not as readily portable as Style E.

The G forge, built in two types with hand or stationary blast, is extensively used for stationary work on account of its durability. The body is of heavy steel plate rigidly braced and provided with wind-guard. It is extensively used by bridge and tank builders, sheet iron workers and riveters in general.

These forges are manufactured by the B. F. Sturtevant Co. of Hyde Park, Mass., who furnish complete forge equipments including the blast, exhaust fans for the removal of the smoke, blast and exhaust piping systems, hoods and blast gates.

Major Hugh J. Gallagher, general staff, United States army, who was detailed by direction of the president for service with the Isthmian Canal Commission, assumed the duties of purchasing agent of the commission last week, with headquarters in the Washington office of the commission. Major Gallagher has had wide experience in purchasing supplies for the army and is regarded at the war department as one of the most efficient purchasing agents in the country.

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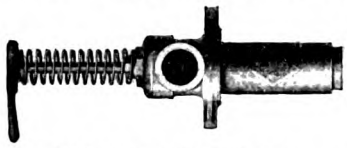
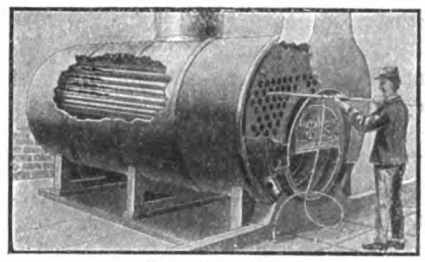
DIAMOND STEAM FLUE BLOWER

The Power Specialty Co., No. 500 Washington street, Detroit, Mich., has placed on the market the Diamond steam flue blower. This blower will be sent to any responsible firm on trial and if it does not give satisfaction can be returned at the company's expense. No boiler can be run economically unless the flues can be kept clean. The accumulation of soot means loss of efficiency, power, time and money. The company says that the only thing to clean out soot with, up to the present time, has been a small blower attached to a piece of hose with one end connected to the steam pipe. The operator had to put the little blower in each and every tube at a time in an effort to blow out the soot and this process was generally repeated several times every day. This had to be done from the front of the boiler, against the natural draft. The inevitable result was that as soon as the soot was forced out by the old method of cleaning every flue singly, it was sucked by the natural draft into the others, and for every tube cleaned the other is filled with the soot driven out from the last one.

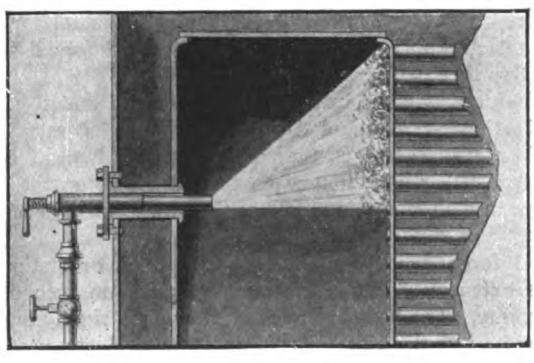


THE DIAMOND BLOWER.



THE OLD WAY.

Experience has established the fact that keeping the boiler open for a longer period than twenty minutes, causes loss of steam pressure and consequent loss of speed in a vessel or the running of machinery. The cost of additional fuel to regain the lost pressure is probably inestimable, as it requires the multiplying of waste three times daily and then again for 300 days. If only about twenty minutes is allowed for blowing out the tubes, it means only half a minute to each tube, and a tube cannot be cleaned in this time blowing against the natural draft. The front part of the tube may be cleaned as far as one can see, but the back part is bound to be full of soot and it is the rear end of the tubes that is the most dangerous to leave soot in, because it is the most exposed to fire.



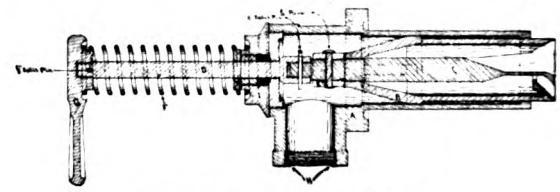
THE NEW WAY.

The Diamond steam flue blower gets rid of all the disadvantages of the old method. It is installed in the rear wall of the boiler and blows the soot with the natural draft of the boiler, to the front and out through the chimney. The thorough cleaning of all the tubes does not take more than five minutes, because it cleans in each operation a cluster of tubes equal to double the distance of the space between rear wall and back of tubes. It does away with the most costly loss of steam pressure and is an immense saver in fuel. Consequently there is no loss of speed and no necessity for extra stoking and fuel.

The company represents that the Diamond blower will clean all tubes their entire length in five minutes. Placed in the rear wall of the boiler the blower works with the natural draft of the boiler and blows the soot out through the chimney.

In the sectional view A represents the shell, B nozzle tube, C nozzle, D handle stem, E brass nut, F spring, G handle, H steam entrance, I cap and J packing nut.

The steam is admitted to the steam inlet H the pressure driving out nozzle tube B and with it nozzle C which has an angular form and causes the steam to spray, covering a multitude of tubes within a diameter equal to double the distance of the space between rear wall and back of tubes at one time. This operation is accomplished by turning handle G. The pressure of steam removes the soot through chimney with the draft. Boilers of large diameter and narrow combustion chamber will require two blowers to accomplish this.



SECTIONAL VIEW OF BLOWER.

PERSONAL

Capt. William D. Ames, who sailed the steamer Sahara of the Tomlinson fleet last season, will bring out one of the new vessels building at the Bay City yard of the American Ship Building Co. for Mr. Tomlinson this season.

Capt. W. P. Benham, who sailed the steamer Martin Mullen last season, will bring out the new steamer building at the Cleveland yard of the American Ship Building Co. for Charles L. Hutchinson of Cleveland.

Capt. A. B. Davis, who has been engaged in government work in St. Mary's river has been detached from the revenue cutter Morrill and retired on full pay. He has had a long and honorable career.

Capt. J. W. Brion, who sailed the steamer Australia last season, has been appointed manager of the vessels operated by Capt. James Corrigan and will hereafter remain ashore.

Capt. Edward Martin, who sailed the steamer Tionesta for the Anchor Line last season will bring out the steamer Juniata this year.

Capt. Edward Thorpe of Buffalo will have charge of the vessels of the Kelley Island Lime & Transport Co.'s fleet next season.

OBITUARY

Capt. John Duncanson, Sr., one of the best known lake pioneers died at Amherstburg on Sunday morning last. He sailed the clipper ships Ellen Park and T. J. Park in the 60's, carrying package freight from Liverpool to Chicago. He retired from active service sixteen years ago. His three sons are prominently identified with lake trade.

The Bendixen Ship Building Co., Eureka, Cal., has closed contract with the North Coast Steamship Co., San Francisco, for an oil burning steam schooner of the following dimensions: 177 ft. long, 36 ft. beam, 12 ft. deep. She will be designed solely for lumber carrying and will have a capacity of 600,000 ft.

The Kelley-Spear Co., Bath, Me., launched the four-masted schooner Orleans last week. She is 170 ft. keel, 37 ft. beam and 14 ft. deep.

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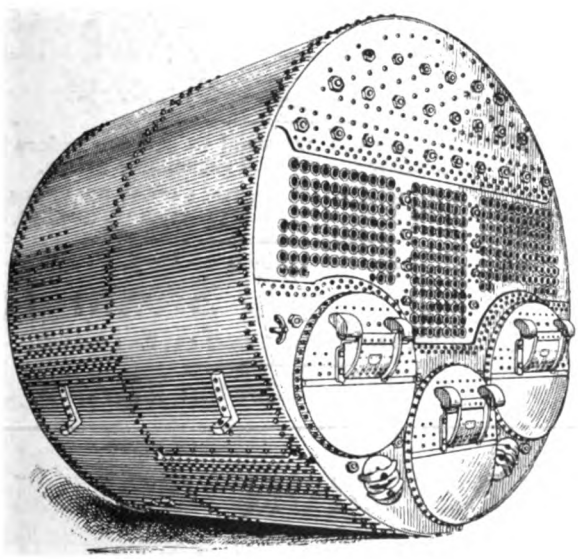

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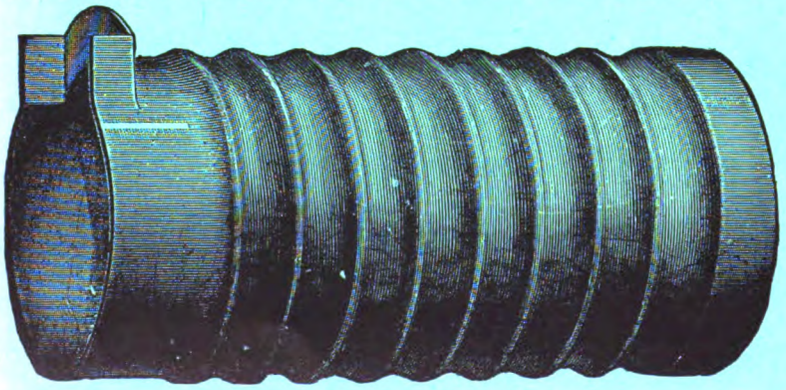

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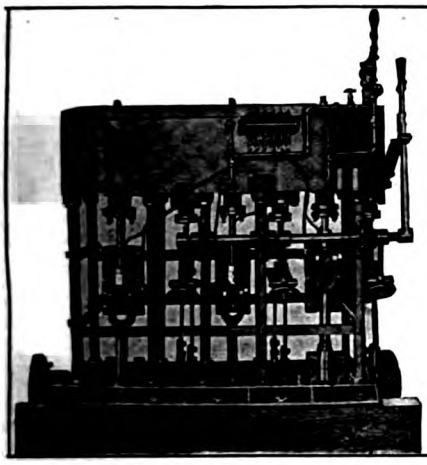

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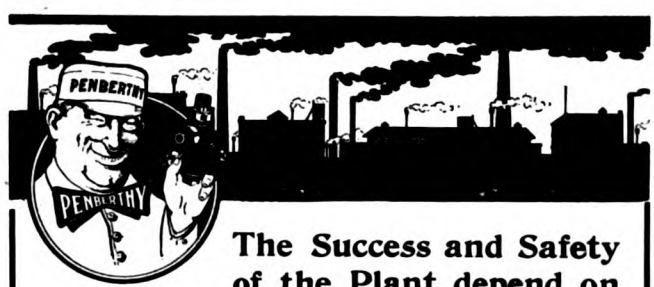

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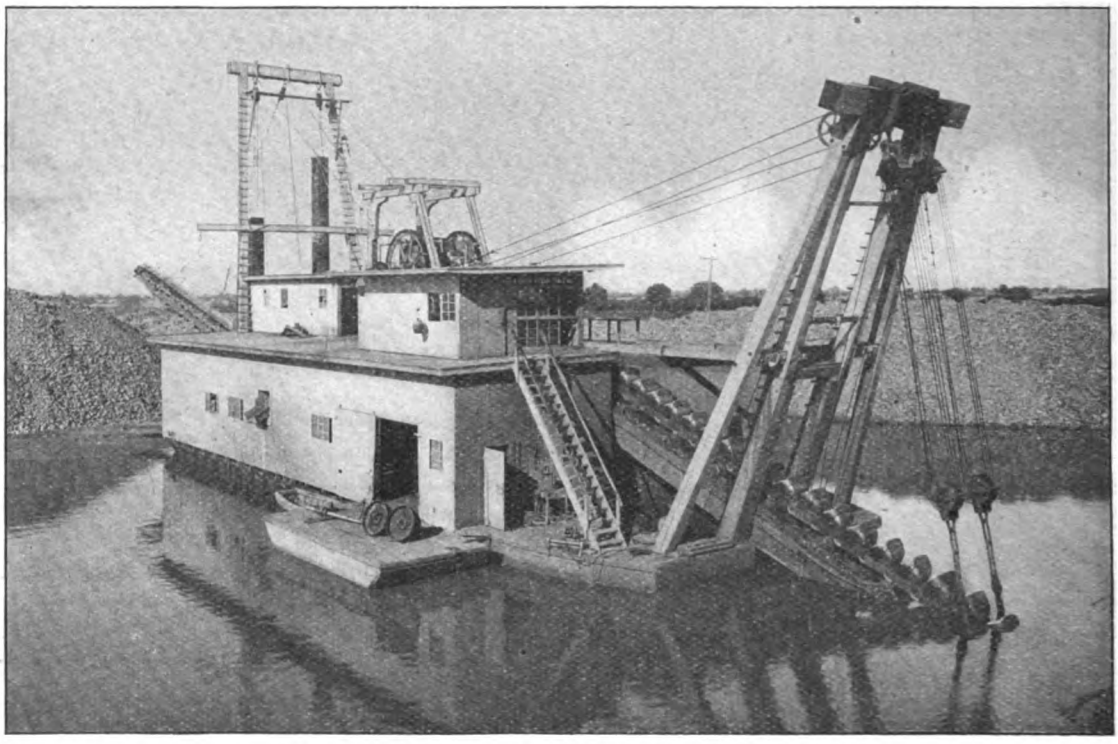
Placer Gold Dredger



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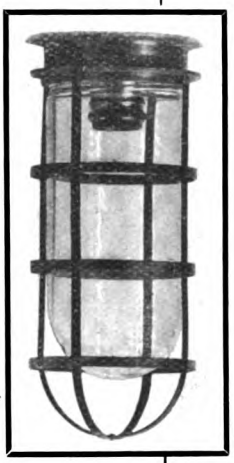

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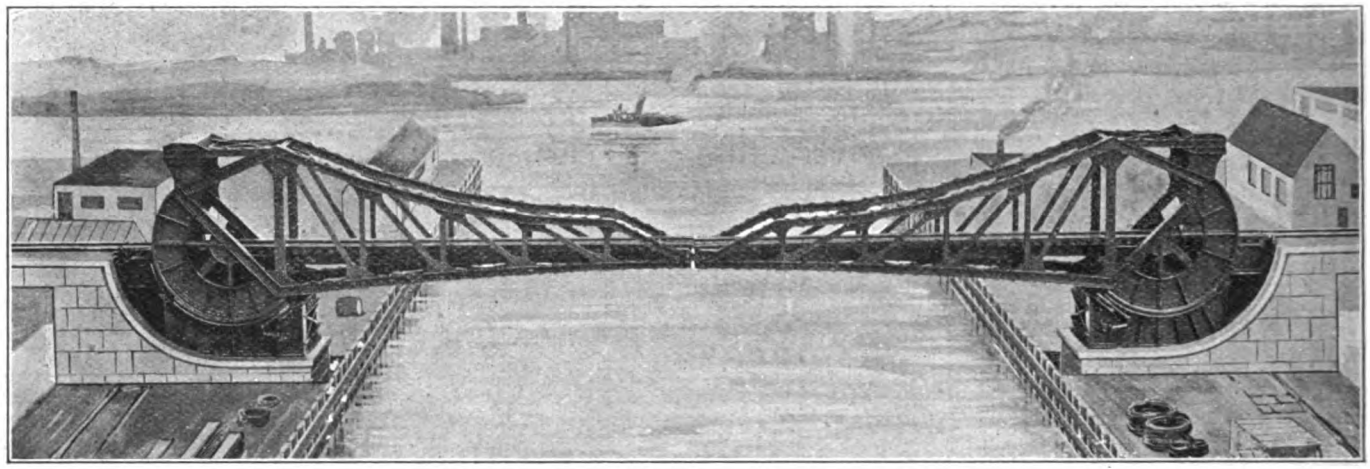

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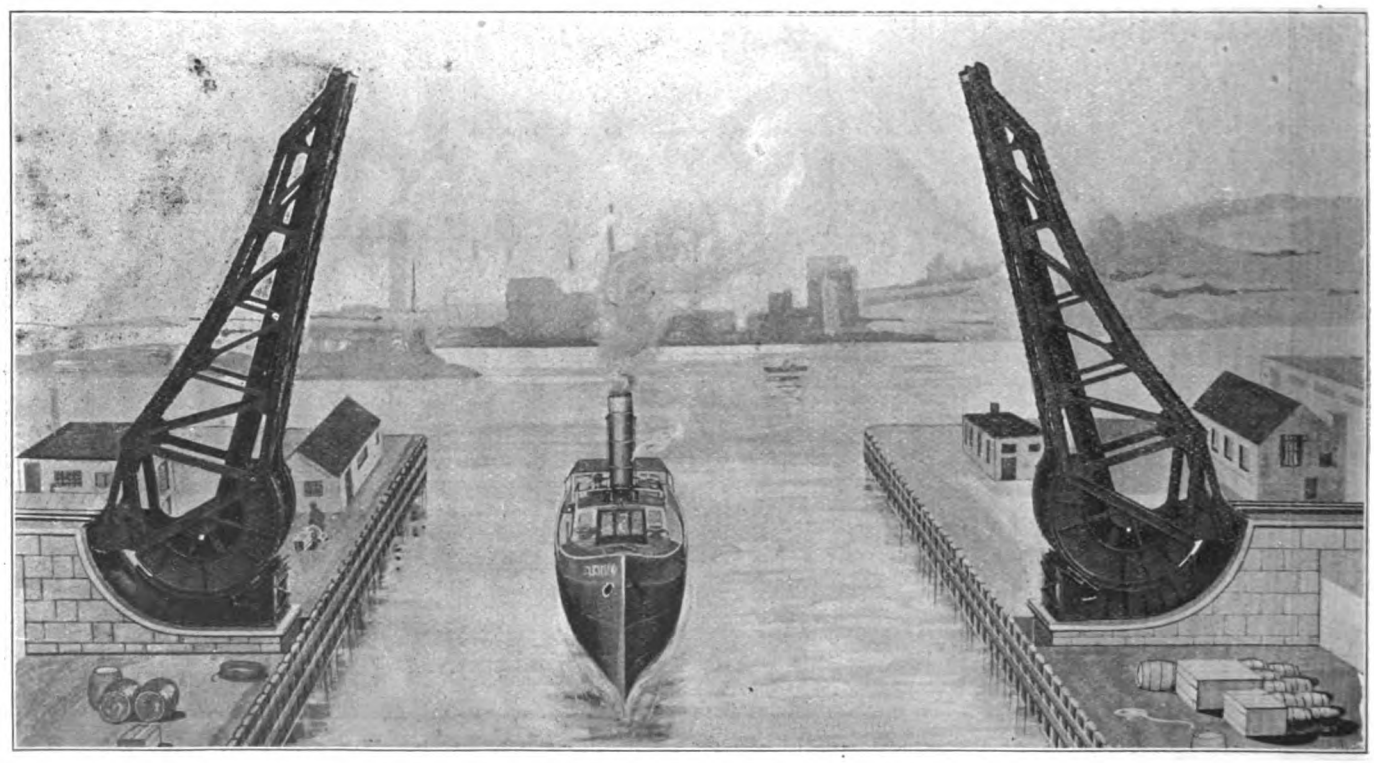

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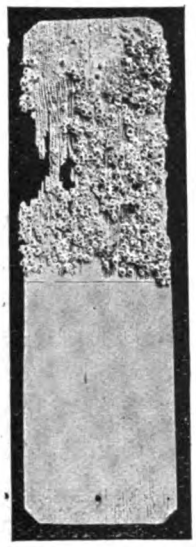
This cut is a copy of a photograph of a Board having one end painted with **"New Jersey" Copper Paint** manufactured by Harry Louderbough, New Jersey Paint Works, Jersey City, N. J., U. S. A., and placed in the water at Port Royal, S. C., for five months. Upon the unpainted end you can note the ravages of the salt water worm so destructive to wood, and also the large number of barnacles that have fastened upon it. Observe the painted end where **"New Jersey" Copper Paint** was applied—its splendid condition.



The board here represented was placed in the water at Port Royal, S. C. by me, and left in the water five months. The painted end was as good as when it was placed in the water.

MILLS EDWARD,
Master Schooner "Florence Shay."

"NEW JERSEY" MARINE MIXED PAINTS

Being quick drying it is desirable for vessels, for what can be more annoying about a vessel than to have paint applied that is slow drying. *Send for sample card,*

"NEW JERSEY" LIQUID METAL POLISH

will produce a bright and durable finish on brass, nickel, tin, copper, zinc, such as brass, zinc and nickel signs, railings, harness trimmings, etc. It will not stain or deface wood work. Popular with the marine trade. *Send for sample.*

"NEW JERSEY" COPPER PAINT

The National Export Exposition, Philadelphia Pa., American Institute, of New York, have awarded us the Highest Attainable Medals for our

MARINE SPECIALTIES

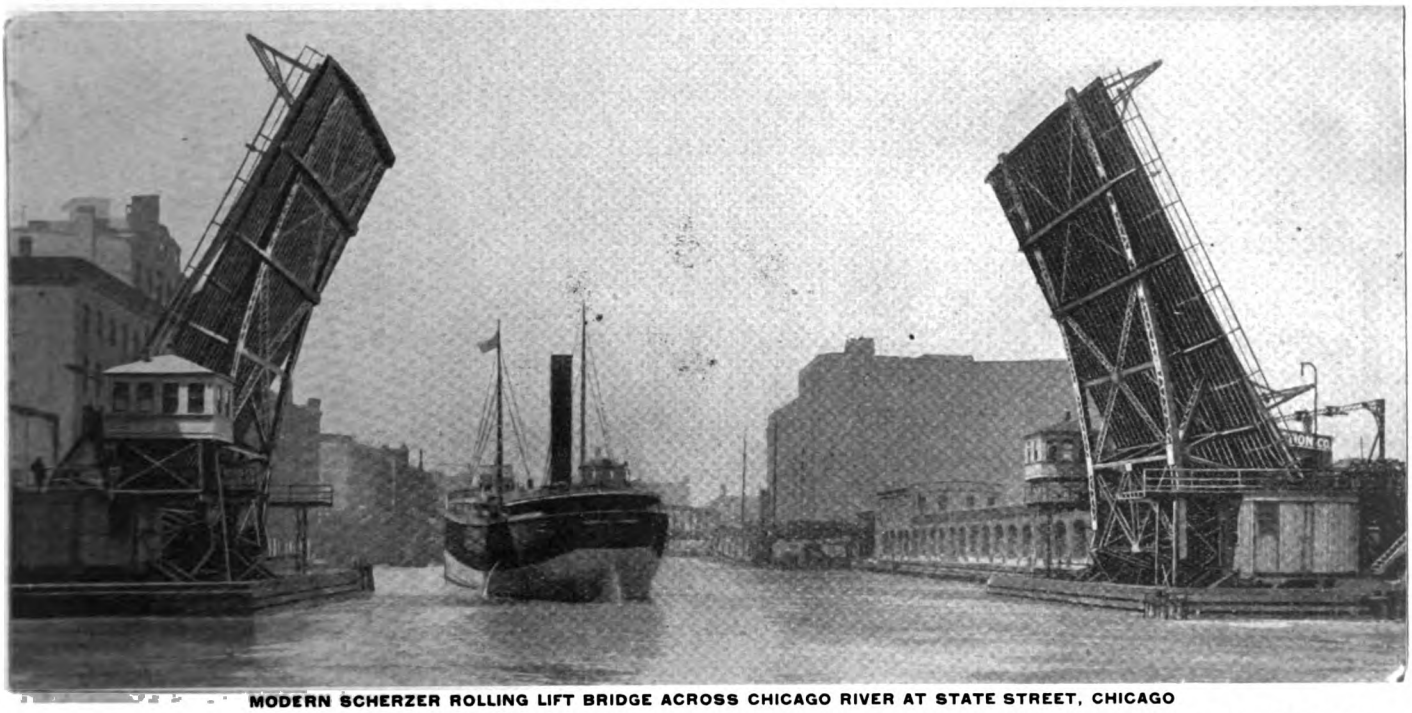
National Export Exposition Medal *American Institute Medal*

"NEW JERSEY" COPPER PAINT.
"NEW JERSEY" YACHT RED COPPER PAINT. Very bright.
"NEW JERSEY" YACHT GREEN COPPER PAINT.
"NEW JERSEY" ANTI-CORROSIVE PAINT. Priming Coat, for Iron Vessels.
"NEW JERSEY" ANTI-FOULING PAINT. Finishing Coat, for Iron Vessels.
"NEW JERSEY" ELASTIC SEAM PAINT.
"NEW JERSEY" YACHT WHITE.
"NEW JERSEY" YACHT BLACK.
"NEW JERSEY" SHIP AND DECK PAINT.
"NEW JERSEY" MARINE MIXED PAINTS.
"NEW JERSEY" MAST PAINT.
"NEW JERSEY" SMOKE STACK PAINT. Ready Mixed for Use.

NEW JERSEY PAINT WORKS

OFFICE AND FACTORY WAYNE AND FREMONT STREETS

HARRY LOUDERBOUGH, Proprietor. **JERSEY CITY, N. J., U. S. A.**



MODERN SCHERZER ROLLING LIFT BRIDGE ACROSS CHICAGO RIVER AT STATE STREET, CHICAGO

"CENTER-PIER SWING BRIDGES form artificial obstructions, destroying navigation, and are being CONDEMNED, REMOVED AND REPLACED by modern SCHERZER ROLLING LIFT BRIDGES wherever Manufactures, Commerce, Transportation, Railways and Ships are Valued, Protected and Advanced."

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LAKE SUPERIOR
IRON ORES

WADE BUILDING CLEVELAND, OHIO

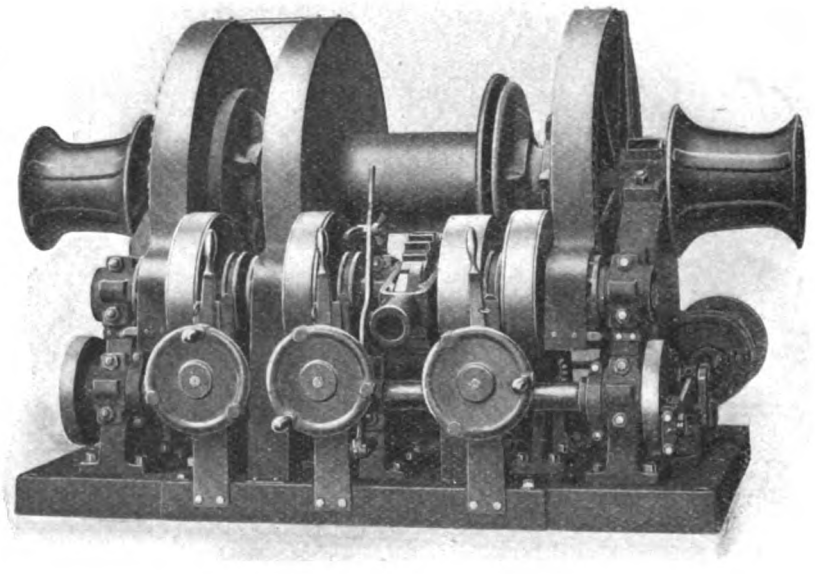

Figure 232

Combined Deck Winch and Windlass

The Chase deck engines, steam capstans, and automatic steam towing machines, are strong and powerful, simple, safe and convenient.

Send for Illustrated Catalogue.

The Chase Machine Co.,

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Codes Western Union and Commercial. Address "Chaseco" Cleveland.

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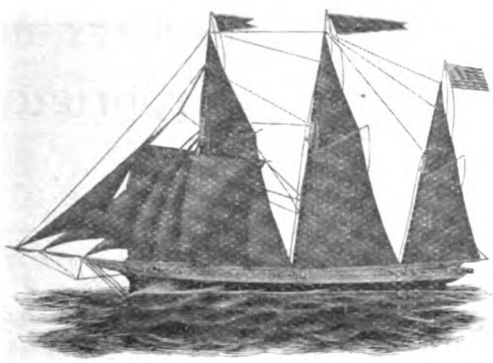
FITTING-OUT VESSELS.

That's our trade.

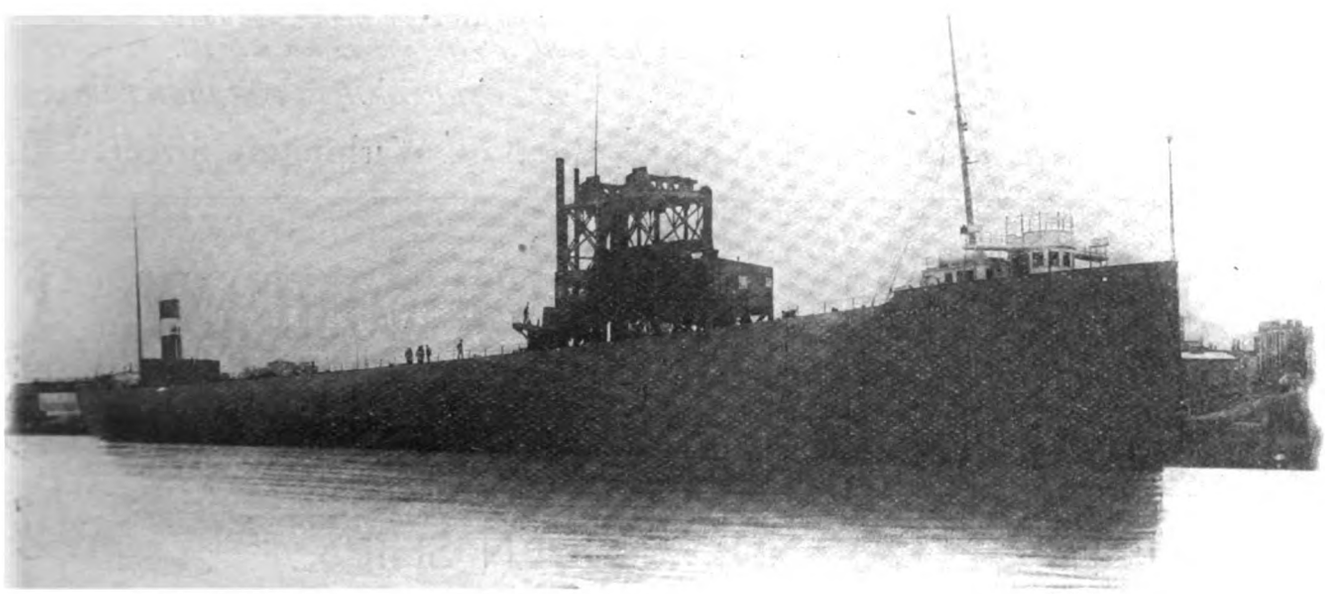
Schooner Nellie Redington. Length over all 215 ft, beam 33 ft. Ore capacity 1,800 tons.



NELLIE REDINGTON

Steamer Augustus B. Wolvin. Length over all 560 ft., beam 56 ft. Ore capacity 10,000 tons.

Compare the growth.



AUGUSTUS B. WOLVIN

The one represents the type of freighter on the great lakes when we began business; the other represents the type today.

We fitted both of them out, and hundreds in between, both for salt and fresh water service. We have grown with the growth of lake trade. There's a reason for it—Good Service.

THE UPSON-WALTON CO.

CLEVELAND, O.

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Dry Dock and Yards: 101st St. and Calumet River, - - - CHICAGO, ILL.

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MILWAUKEE, WISCONSIN.

Ship Repairs of all kinds.

Two Ship Yards offer every Facility for the Repair of both Steel and Wooden Vessels.

South Yard Dock is 450 ft. long on keel blocks; 460 feet over all; 60 feet width of gate, and 16 feet over sill.
West Yard Dock 312 feet on keel blocks; 45 feet width of gate, and 12 feet over sill.

RUDDER PIT IN EACH DOCK. *ELECTRIC LIGHTS FOR NIGHT WORK.*

Main Office at SOUTH YARD, Foot of Washington Street.

Edward Smith, President. William Knight, Ass't Sec'y and Treas. Adam Steel, Superintendent.

THE BUFFALO DRY DOCK COMPANY,

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-Ton Shear Legs, and in every way Equipped with Modern Plant for the Building and Economical Repairs of

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THE SUPERIOR SHIP BUILDING COMPANY,

Ship and Engine Builders.
Dry Dock and Repairs of all kinds.
Two Largest Dry Docks on the Lakes.

Large Stock of Material Always on Hand for Repairing Wooden and Metal Ships.
Repairing Promptly Attended to, Night or Day.

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Dry Dock at Lorain, 560 ft. x 60 ft. x 17 ft.

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Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System, as applied to boilers, giving increased power and great economy.

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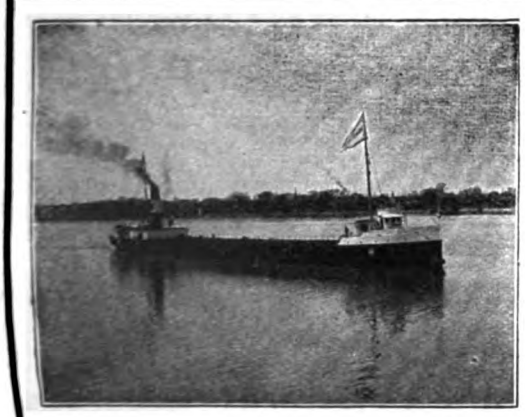

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New Dry Dock—525 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

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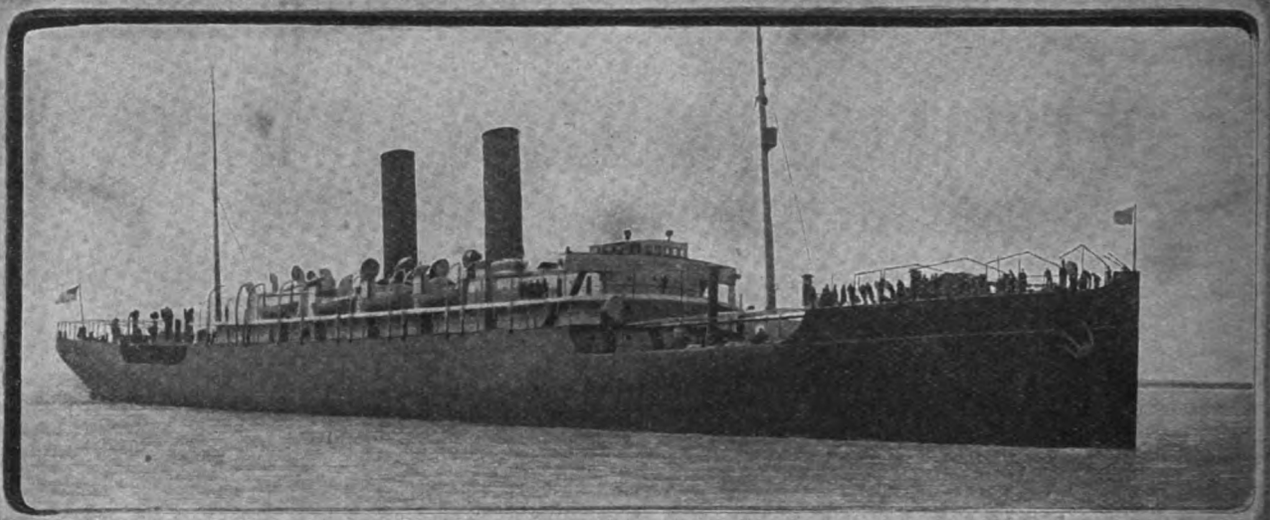

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Adopted by the English, German, French, Russian and United States Light House Departments for Channel and Harbor Lighting; over 1800 gas buoys and gas beacons in service. : : : :

BURN CONTINUOUSLY FROM 80 TO 365 DAYS AND NIGHTS WITHOUT ATTENTION AND CAN BE SEEN AT A DISTANCE OF SIX MILES. : : : :

Brilliant and Steady Illumination. **Economical and Reliable in Operation**

Controlled by the

SAFETY CAR HEATING AND LIGHTING COMPANY,

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Established 1860

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Manufacturers of

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Comply fully with all the Requirements of the United States Board of Supervising Inspectors of Steam Vessels and will be Passed by all Local Inspectors.

Brass or Nickel Seat—Locked up Self-Adjusting Pop Regulator.

Powerful Cam Lever—Encased Springs Handle Cap for Turning Valve on its Seat.

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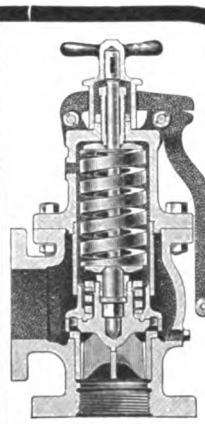

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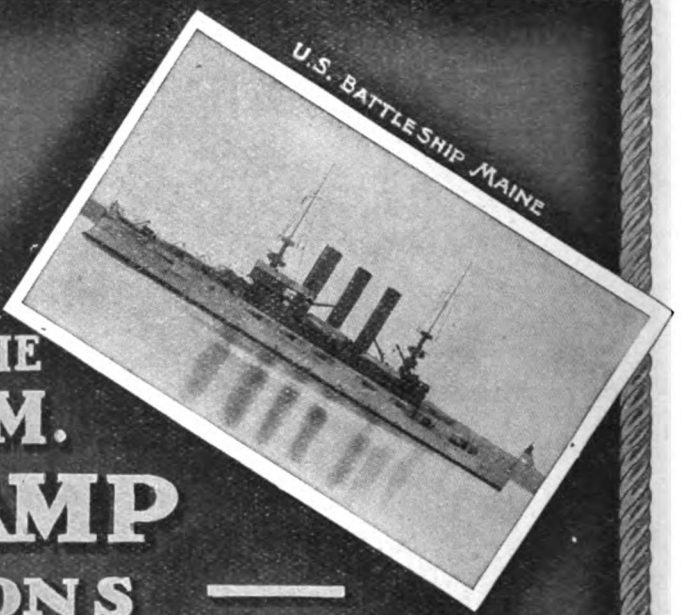

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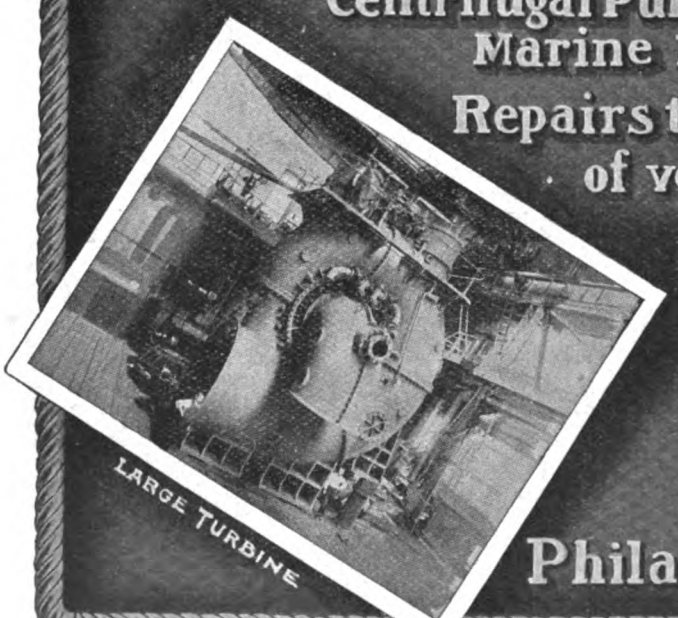

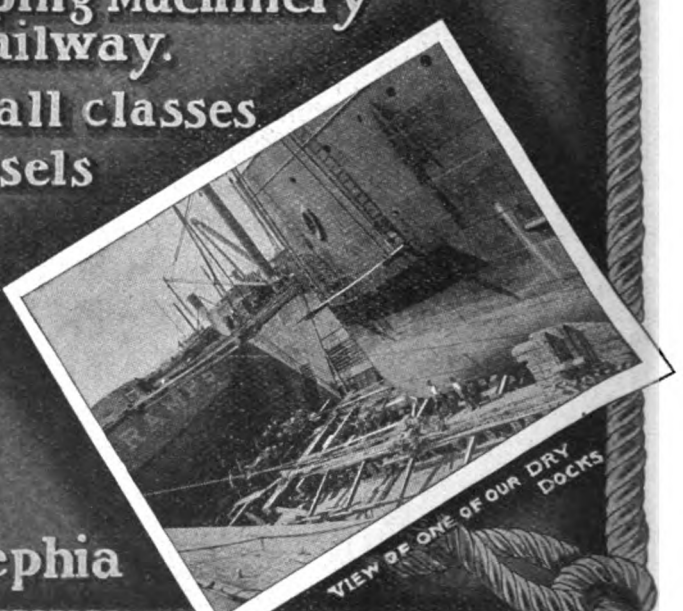

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Requires no space at sides or rear—cleaned from the front.
Employs no tube-caps—tubes can readily be withdrawn without mutilation.
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12 Pockets. Platform. Low Dock.

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MARINE SUPPLY COMPANY——STORE AND ICE HOUSE ON DOCK.

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Steamboat Fueling Facilities at Various Points on the Great Lakes:

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Forgings of all kinds

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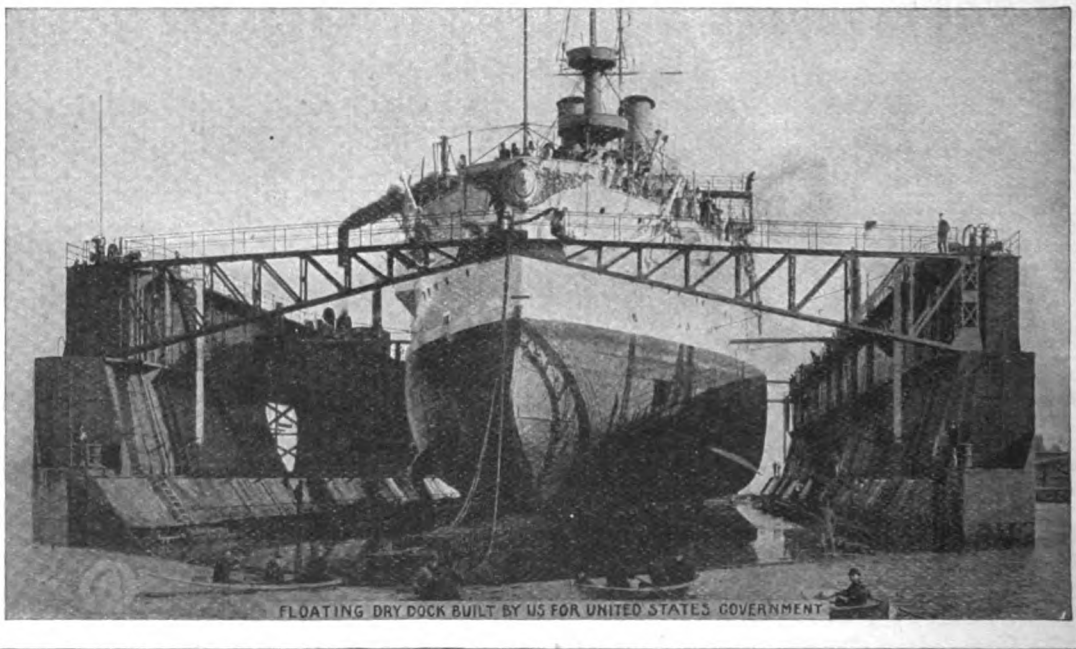

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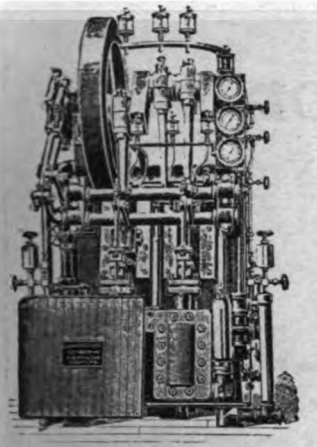

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Contains no chemicals; only air at 65 lbs. pressure in pipes.

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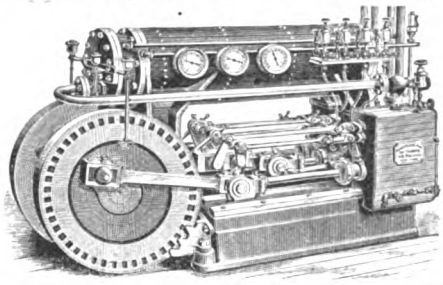
MORE THAN 150 IN DAILY SERVICE ON STEAM VESSELS.

It is as noiseless as any steam engine.



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41 MAIDEN LANE, NEW YORK.

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With anything but

Oxide of Zinc Paint

Is to commit a wasteful act of folly. All ship painters know, or ought to know, that there is no marine white except

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We do not grind zinc in oil. List of zinc paint manufacturers furnished on request.

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SAFETY WATER TUBE BOILER CO.

MANUFACTURERS OF

High Grade Marine Water Tube Boilers.

Generators of the Highest Quality of Steam.

Nearly 1500 in use.

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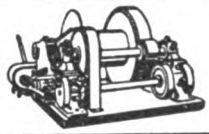

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Suitable for all Boats from 3½ to 200 H.P.
Over 100 in successful use.
Also the well known and always reliable Woolters Gas or Gasolene Stationary Engines.

HOISTING ENGINES
Of all kinds and sizes, and for all purposes, especially for ship use.
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AUTOMATIC TOWING MACHINES
Somewhat the cheapest, and altogether the best. Positively guaranteed.
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FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO.

THE CHASE MACHINE CO. Engineers and Machinists, CLEVELAND, OHIO.

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Builders of

SHIPS — ENGINES — BOILERS
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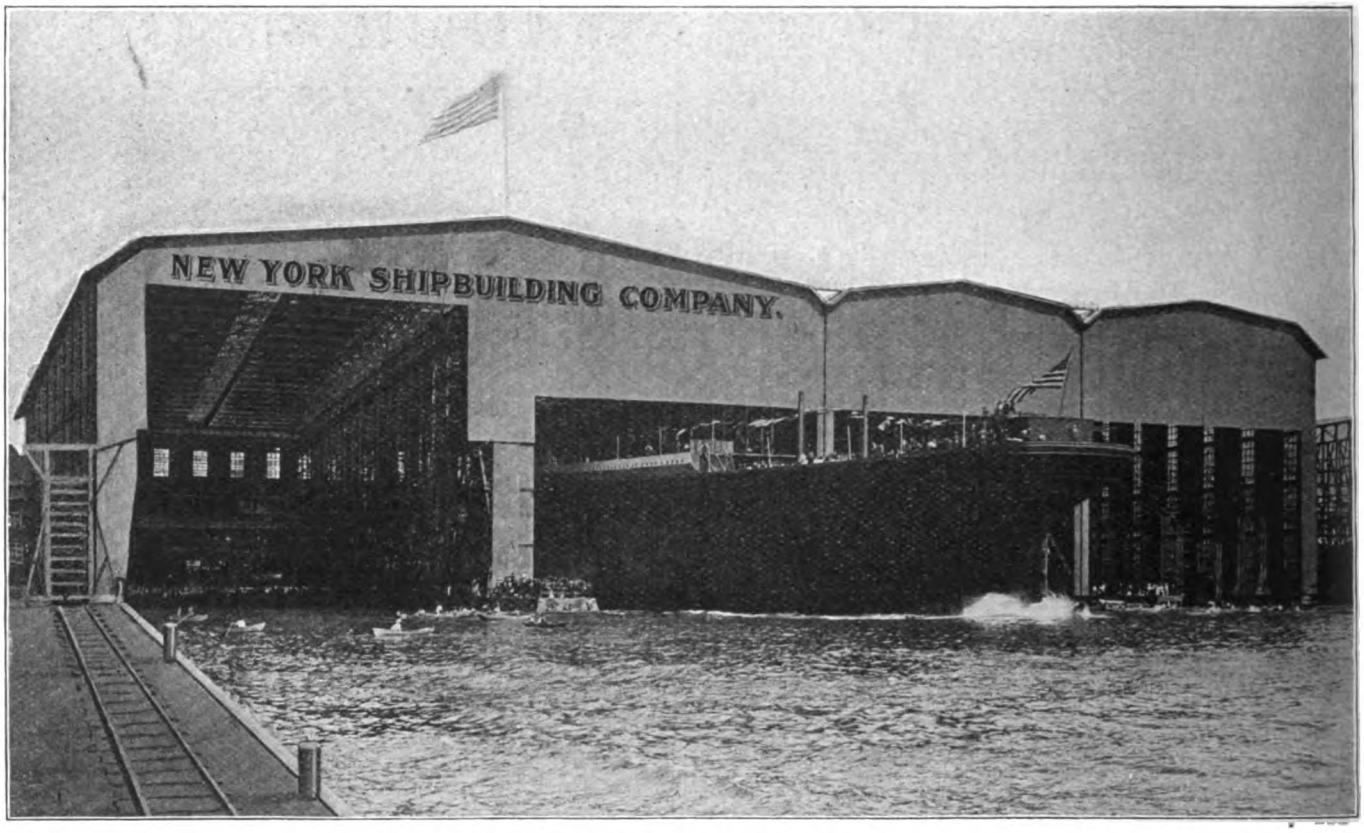

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615 feet long, 65 feet beam, 51 feet deep.

Best Facilities for Repair Work

Pneumatic and Electric Tools;
ample wharfage accomodation.

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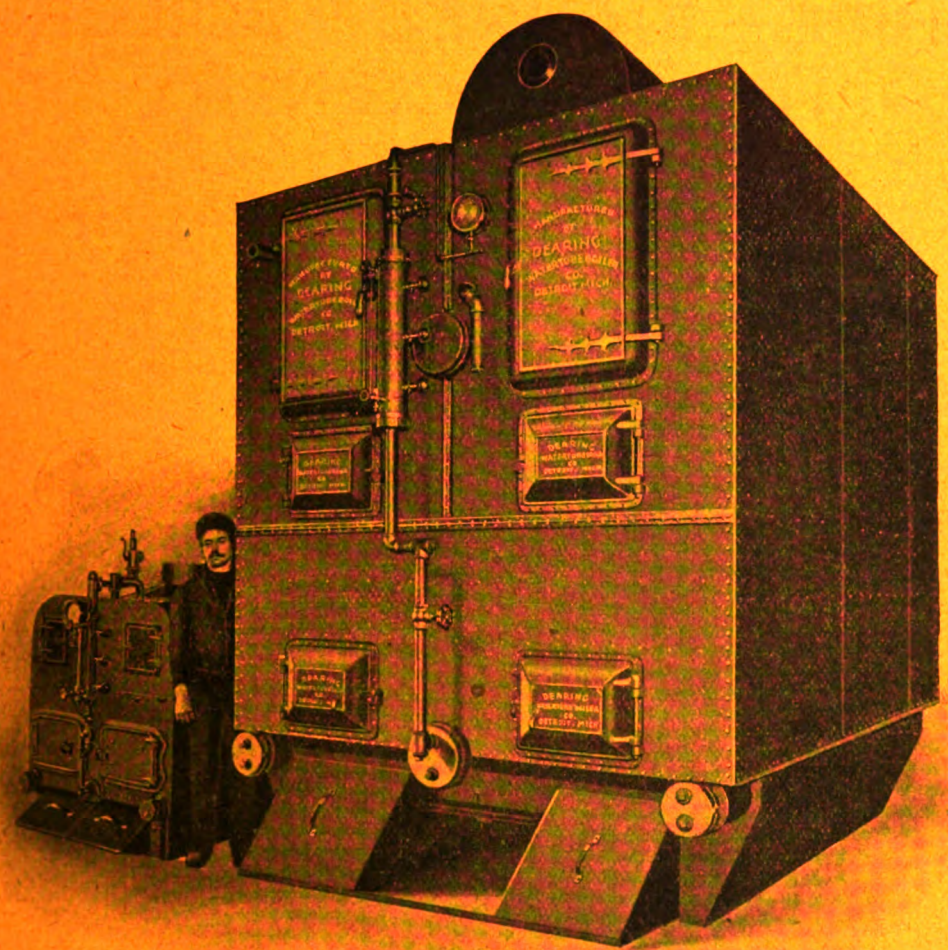
mark the perfection of the

Water Tube System.



THEY have established a new epoch in boiler making. Every vital detail is **vastly superior** to all preceding boilers. Their **scientific construction** has achieved the acme of **PERFECT CIRCULATION.** More than a thousand in use and every user will tell you they are "perfect pieces of machinery," taking precedence over all others in the

PRODUCTION OF DRY STEAM

The other points of superiority are too numerous for explanation here, so drop a postal for full information and catalogue about **DEARING BOILERS, the perfection of the Water Tube System.**

Dearing Water Tube Boiler Co.

DETROIT, MICH.

Some territories open for agencies.

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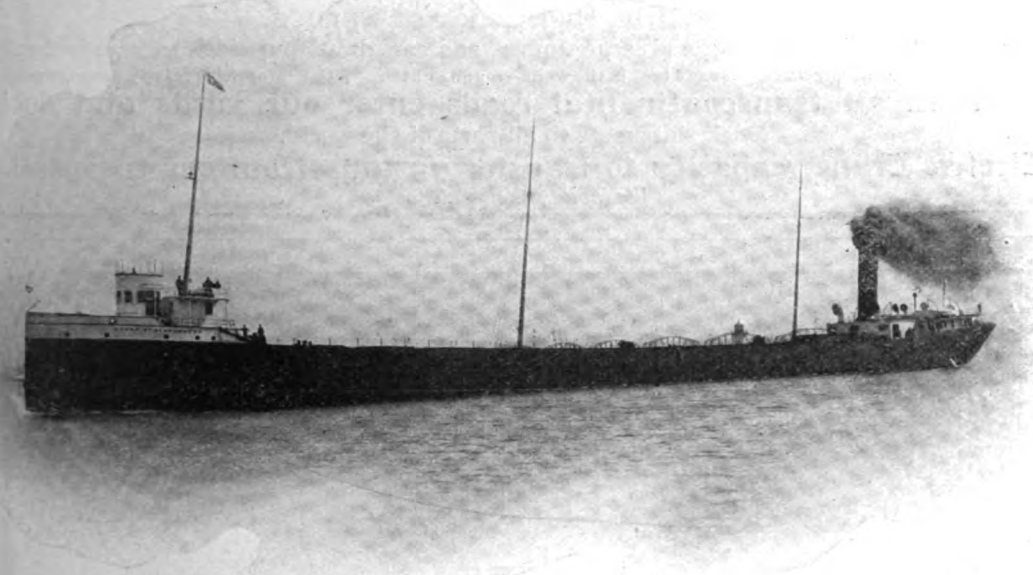
Port Huron Shipbuilding Company

Port Huron, Mich.

Steel Ship Builders. Marine Engines and Boilers.

Plant capable of Building and Docking longest and widest ships on the lakes.



STEEL FREIGHTER HENRY STEINBRENNER.

Three Ship Building Berths, 400 ft., 700 ft. and 800 ft. long.
Dry Dock 700 ft. long, with gate to admit vessel of 60 ft. beam.
Ship Yard covers 33 acres with 2100 ft. river frontage.
75-ton shear legs on wharf.

Entire plant of steel construction, electrically operated, with traveling cranes in shops, over building berths and storage racks.

Repairs executed with dispatch.

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MORAN BROS. COMPANY
SEATTLE, WASHINGTON

SHIP AND ENGINE BUILDERS

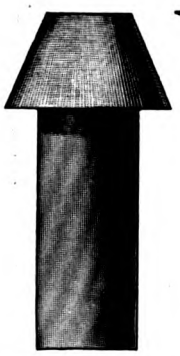
Steel and Wood Vessels, Steam or Sail for Ocean, Sound and River Service.
Foundry, Machine, Boiler and Forge Shops.
Largest tools and equal to any requirement. Heavy forgings a specialty.

DRY DOCK AND MARINE RAILWAY

Two-Section balanced floating dry dock, 400 feet long, 60 feet between towers; patent steel wedge keel blocks; 12,000 tons displacement.
Capacity of Marine Railway 1,500 tons.
Ship Chandlery. **Engineers' Supplies**

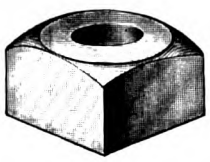
SAW AND PLANING MILL

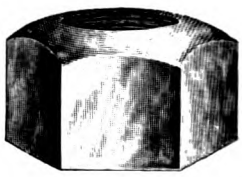
Capacity: Timber 48 in. square, 125 ft. long, including every description of Rough, Dressed or Kiln Dried
Yellow Fir, Red Cedar or Spruce.
We make a specialty of long and large timber, and can dress four sides 20 x 30 inches.
SPARS: longest, largest clearest and best in the world—rough or hewn. PILES or timber of any description.
Cars from all transcontinental roads enter our yards and dock.
Dock shipments to all parts of the world.
Electric Crane, capacity to transfer 75 tons from car to vessel.
We invite correspondence.



THE UPSON NUT CO.,
CLEVELAND, O.

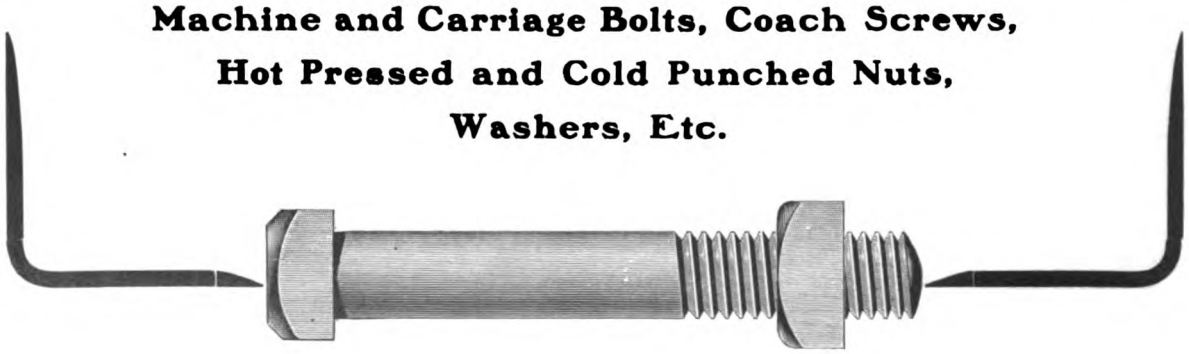
Boiler and Ship Rivets
of the Highest Quality and Finish,





also

Machine and Carriage Bolts, Coach Screws,
Hot Pressed and Cold Punched Nuts,
Washers, Etc.



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"Wiltbonco" Steam Plant Accessories

Awarded Gold Medal at Universal Exposition, St. Louis, 1904.

Klinger Reflex Water Gauges and Wiltbonco Gauge Mountings

are used by all the principal Navies of the world, Merchant Marine, and for Locomotives, Automobiles, Stationary and Portable Boilers.

"THE WATER SHOWS BLACK"

Especially adapted for High Pressure.

CUSHION PRESSURE SEATED CONTROL COCKS

For all liquids and gases.

"FREEPORT" VALVES

For all purposes, but particularly designed for high pressures and superheated steam.

"SAFETY" PLASTIC METALLIC PACKING,

COOPERITE SHEET PACKING,

For high pressures and superheated steam, acids, ammonia, etc.

WILTBONCO-HOGAN OIL FILTERS.

Wm. T. Bonner & Co.

Engineers, Contractors and Manufacturers

Boston Office, 53 State St.

New York Office, 141 Broadway

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THE "LONG-ARM" SYSTEM
MAKES
THE SHIP UNSINKABLE.

It closes Bulkhead Doors by electricity in time of emergency.
It gives local control to the man on the spot.
Its fuses do not burn out. The Power is always on.
It is approved, after full tests, by the U. S. Navy Department, and is installed on thirteen new warships.

THE "LONG-ARM" SYSTEM CO., Cleveland, Ohio.

The MIETZ & WEISS

Two Cycle **OIL ENGINES** Constant Thrust

—— Operated By ——

Kerosene Oil, Fuel Oil, Distillate or Crude Oil.

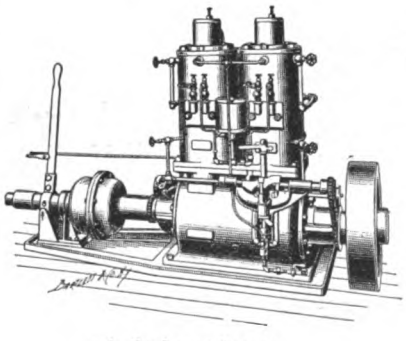
Simplest, Safest, most Reliable and most Economical Engines on the market.

MARINE TYPE

No Valves, Cams or Gears
No Electric Sparking Devices
Automatic Ignition by Compression
No Dangerous Gasolene used

STATIONARY TYPE

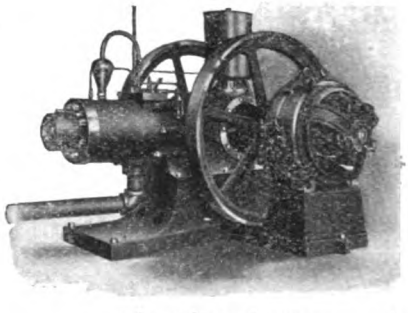
Especially adapted for operating electric generators for lighting launches, yachts and house boats. Perfect regulation, greatest economy and absolute safety.



1 to 60 horse power.

See our Exhibit at the Sportsman's Show, Madison Square Garden, Feb. 21 to March 9.

Send for Catalog
Dept. 102



1 to 75 horse power.

AUGUST MIETZ
Iron Foundry and Machine Works

128-138 MOTT STREET **NEW YORK, U. S. A.**

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Sheriffs Manufacturing Co.

Established June 1854

Fifty-one years in business

Marine Machinery.

2500 Propeller Wheels made to date.

Milwaukee, Wis.

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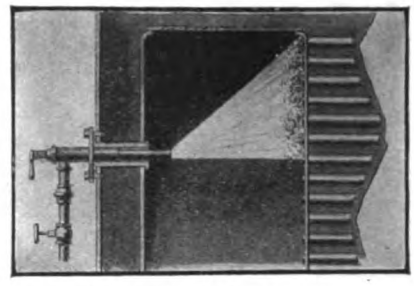
The "Diamond" Steam Flue Blower.

The Diamond Blower.

This machine will be sent on trial to any responsible house with the full privilege of retaining or returning same.

SOMETHING NEW.

The "Diamond" Blower is the outcome of many years' experience and hard labor and meets the demand so often made for a commonsense method of removing soot from boilers. We give you below the points of merit in one division and the points of demerit in the other for your consideration.



Diamond Blower in Operation.

The New Method of Cleaning Boilers	vs.	The Old Method of Cleaning Boilers
Economical and Thorough. Cleans all tubes their entire length in five minutes. No loss of steam pressure—No opening of britchings—No slackening of machinery.		**Wasteful.** An attempt to clean each tube singly with steam hose consumes at least thirty minutes each time and does not accomplish the purpose. Results in reduction of steam pressure, loss of power, slackening of machinery.
Effective. Placed in rear wall of boiler, works with the natural draught of boiler and blows soot out the chimney and absolutely prevents the accumulation of soot. A simple turn of the handle sets the blower in operation and can be turned on and off at will. Keeps flues thoroughly cleaned and insures maximum boiler efficiency.		**Ineffectual.** Working against natural draft, it is impossible to reach accumulations of soot at rear end of boiler tubes. Soot forced from one tube is sucked by the natural draught of the boiler into another. For every tube cleaned another is filled up with soot.
Saves Money. Permanent fixture—first small cost only expense. Saves wages of firemen. Saves cost of hose. Saves fuel and time.		**Expensive.** Labor of fireman an expense without result as the flues cannot be cleaned this way. Hose wears out quickly and has to be frequently replaced, a source of continual expense, shirking of duty.

Do not these points appeal to you? It will be to your interest to investigate the matter carefully.

POWER SPECIALTY CO.

Main Office:
500 Washington Street,
DETROIT, MICH., U. S. A.

Canadian Office:
Windsor, Ontario, Canada.

European Office:
Berlin, Germany.
35 Chaussee St.

Shipments to Canada and British Colonies can be made from our Canadian Factories.

POWER SPECIALTY CO. Windsor, Ont. Canada. Germania Berlin, Germany. DETROIT, MICH. U.S.A. TRADE MARK

The Sturrock Patent Furnace Bridge Wall

ALEXANDER HYND, Agent for Great Lakes.
208-209 Western Reserve Building, Cleveland, Ohio.

SPECIAL ADVANTAGES

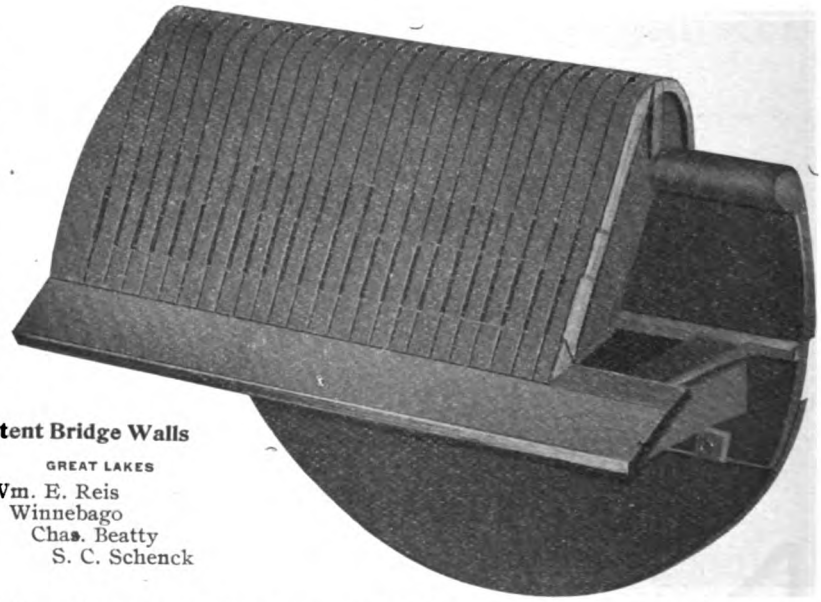
Can be removed without destroying any part of the bridge, and all replaced without requiring any renewals.

No dead fire at the bridge wall as no clinker ever collects on it.

Will not burn, warp or twist.

A permanent bridge wall entailing no expense for renewals.

Will save its cost many times over.



Some of the Steamers using Sturrock Patent Bridge Walls

BRITISH	AMERICAN COAST	GREAT LAKES
Etruria	Catalone	Wm. E. Reis
Elsiston	Mystic	Winnebago
Clematis	Silvia	Chas. Beatty
Ellaston	Dominion	S. C. Schenck
Unity	Rosalind	
Cleethorpes		

This bridge wall has now been in use in practically continuous service for four years with absolutely no cost for renewals or repairs

Owners or engineers desiring to have these fitted for the coming season of navigation will confer a favor by ordering early to avoid the rush during the period of fitting out in the spring.

REFERENCES FROM ALL THE ABOVE USERS CAN BE FURNISHED ON APPLICATION

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ESTATE OF M. A. HANNA D. R. HANNA R L. IRELAND

M. A. Hanna & Co.

COAL, IRON ORE AND PIG IRON

Lake Superior Ores, Bessemer and Non-Bessemer, Including High-Grade Mesabis.

Bessemer, Foundry and Lake Superior Charcoal

PIG IRON

Miners and Shippers of Mansfield, Youghiogheny, Pittsburg No. 8 Massillon and West Virginia

COAL

SPECIAL ARRANGEMENTS FOR

Furnishing Fuel to Steam Vessels at Ashtabula Harbor.

Offices: PERRY-PAYNE BUILDING, CLEVELAND, OHIO

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THE GOLD MEDAL

AWARDED

TO

Dearborn Methods of treating Boiler Waters at the World's Fair, St. Louis,

SIMPLY CONFIRMS

the verdict reached long ago by the many thousands who have learned the value of Dearborn methods by experience.

The award at St. Louis was made on the remarkable results obtained by Dearborn methods in keeping a battery of 3,000 H. P. water tube boilers free from scale and corrosion during the six months run at the Fair.

Many of the largest lines of vessels on the Lakes are constant users of Dearborn Compound. Our Special Formula, made to suit all of the waters of the Great Lakes, can be obtained through prominent ship chandlers, or direct. Write us.

DEARBORN DRUG & CHEMICAL WORKS

WM. H. EDGAR, President. ROBT. F. CARR, Vice-President and Gen. Mgr.
CHAS. M. EDDY, Sec. and Treas. WM. B. McVICKER, 2d Vice-Pres. and East. Mgr.

LABORATORIES AND WORKS, CHICAGO

NEW YORK: 120 Liberty Street CHICAGO: 27-34 Rialto Building

BRANCH OFFICES:

Philadelphia, The Bourse
Detroit, Majestic Bldg.
Denver, Boston Block
Boston, Oliver Bldg.
Atlanta, Prudential Bldg.
Salt Lake City, Dooley Block
Pittsburg, House Bldg.
St. Louis, Security Bldg.
San Francisco, 115 Davis St.
Buffalo, Ellicott Square Bldg.
Kansas City, N. Y. Life Bldg.
Los Angeles, 307 N. Los Ang. St.
Cincinnati, Union Trust Bldg.
St. Paul, 1237 Lincoln Ave.
Honolulu, 42 Queen St.

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Office of the Atlantic Mutual Insurance Company.

NEW YORK, January 20th, 1904.

The Trustees, in conformity with the Charter of the Company, submit the following statement of its affairs on the 31st of December 1903.

Premiums on Marine Risks from 1st January, 1903, to 31st December, 1903,			$3,174,147.73
Premiums on Policies not marked off 1st January, 1903,			800,368.56
Total Marine Premiums,			$3,974,516.29
Premiums marked off from 1st January, 1903, to 31st December, 1903,			$3,250,364.45
Interest received during the year,	$336,185.20		
Rent " " " less taxes,	111,923.77	$448,108.97	
Losses paid during the year which were estimated in 1902 and previous years,	$ 322,490.79		
Losses occurred, estimated and paid in 1903,	1,065,141.83		
		$1,387,632.62	
Less Salvages	$146,587.55		
Re-insurances,	64,028.75	210,616.30	
Returns of Premiums and Expenses, $467,841.97		$1,177,016.32	

The Company has the following Assets, viz:

United States and State of New York Stock, City, Bank and other Securities,			$5,170,084.00
Special deposits in Banks and Trust Companies,			1,612,252.53
Real Estate corner Wall and William Sts., and Exchange Place,		$3,789,000	
Other Real Estate and claims due the Company,		75,000	3,864,000.00
Premium notes and Bills Receivable,			1,107,221,88
Cash in the hands of European Bankers to pay losses under policies payable in foreign countries,			182,001.68
Cash in Bank,			89,461.72
Amouut,			$12,025,021.81

Six per cent interest on the outstanding certificates of profits will be paid to the holders thereof, or their legal representatives, on and after Tuesday the second of February next.

The outstanding certificates of the issue of **1898** will be redeemed and paid to the holders thereof, or their legal representatives, on and after Tuesday the second of February next, from which date all interest thereon will cease. The certificates to be produced at the time of payment, and cancelled.

A dividend of **Forty** per cent. is declared on the net earned premiums of the Company for the year ending 31st December, 1903, for which, upon application, certificates will be issued on and after Tuesday the third of May next.

By order of the Board,

G. STANTON FLOYD-JONES, Secretary.

TRUSTEES

GUSTAV AMSINCK,	HERBERT L. GRIGGS,	LEVI P. MORTON,
FRANCIS M. BACON,	CLEMENT A. GRISCOM,	HENRY PARISH,
JOHN N. BEACH,	ANSON W. HARD,	FREDERIC A. PARSONS,
WILLIAM B. BOULTON,	MORRIS K. JESUP,	DALLAS B. PRATT
VERNON H. BROWN	LEWIS CASS LEDYARD,	GEORGE W. QUINTARD,
WALDRON P. BROWN	FRANCIS H. LEGGETT,	A. A. RAVEN,
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EWALD FLEITMANN,	CHARLES H. MARSHALL,	WILLIAM C. STURGES,
	W. H. H. MOORE,	

A. A. RAVEN, *President* — F. A. PARSONS, *Vice-President*

CORNELIUS ELDERT, *2nd Vice-President* — THEO. P. JOHNSON, *3rd Vice-President*

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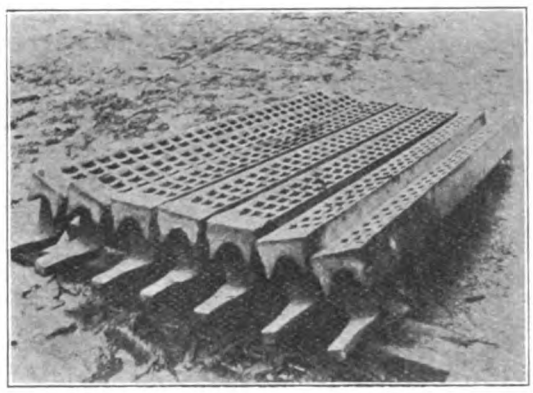
WILLOUGHBY — ST. JOHN

(Patent) (Improved)

SHAKING GRATES.

In use by United States, Russian and Japanese governments in all vessels built under speed requirements. An entire *Absence* from necessity for cleaning fires. Less repairs to boilers. A positive guaranteed saving in fuel, labor and cost of repairs.

SIMPLE AND EFFECTIVE.



Keep fire doors closed and have a more regular temperature in furnace, less burning out of tubes.

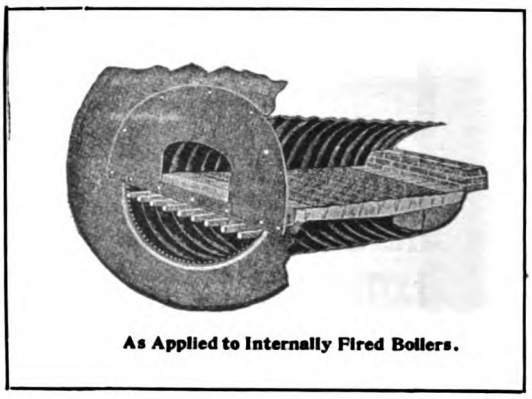
Larger air space, lower rate to incoming air and flue gases.

Larger total consumption of fuel.

More power.

Less work on firemen and no wearing out.

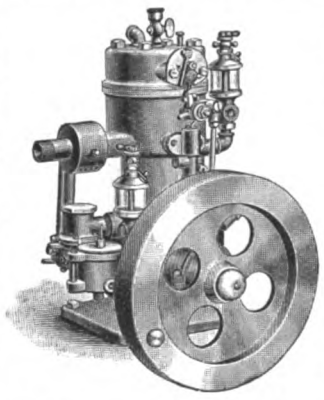
Will guarantee life of these grates for three years.



As Applied to Internally Fired Boilers.

FOR PARTICULARS, WRITE TO SECTION P, MACHINERY DEPT.

A. B. WILLOUGHBY, Manufacturer, Bourse, Philadelphia, U. S. A.



THE KNOX ENGINE

STRONGEST
SIMPLEST
MOST RELIABLE

One and Two Cylinders

1½ to 13 H. P.

Send for Catalog "A".

Camden Anchor-Rockland Machine Co.,
Rockland, Maine.

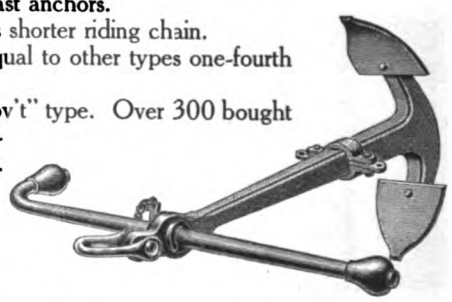
CAMDEN ANCHORS

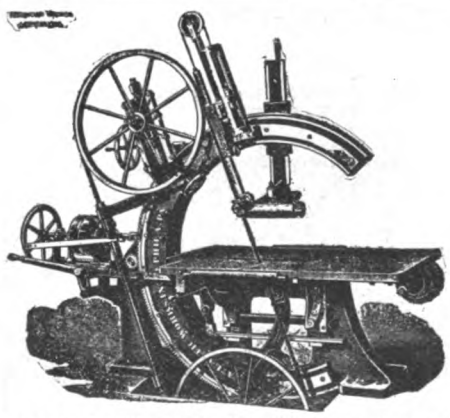
Forged from the very best wrought iron scrap, far superior to cast anchors.

Construction allows shorter riding chain.

Holding power equal to other types one-fourth heavier.

Cut shows our "Gov't" type. Over 300 bought by U. S. Government in 1903.





ADJUSTABLE BEVEL BAND SAW.—Will bevel both ways at 45 degrees. Power Movement to change angles. Power feed in three directions.

ESTABLISHED 1869. INCORPORATED 1896.

ATLANTIC WORKS INCORPORATED,

Successors to Berry & Orton Company.

2870-72-74-76-78 Gray's Ferry Road, PHILADELPHIA, PA.

MANUFACTURERS OF

MACHINERY FOR WORKING WOOD

FOR USE IN

Ship Yards, Car Shops, Railroad Shops.

SEND FOR CATALOGUE. ESTIMATES FURNISHED.

Hollow Chisel Mortisers. **Car Sill Dressers.**

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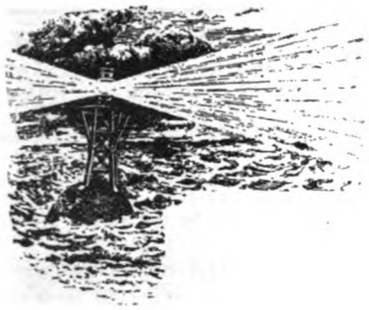


PINTSCH

GAS LIGHTED BUOYS.

Highest Award—St. Louis.

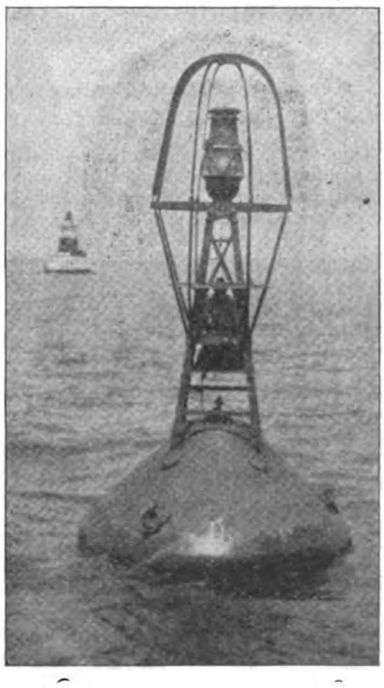
Adopted by the English, German, French, Russian, Italian and United States Lighthouse Departments for Channel and Harbor Lighting. Over 1,800 Gas Buoys and Gas Beacons in service.

BURN CONTINUOUSLY

from eighty to three hundred and sixty-five days and nights without attention, and can be seen at a distance of six miles.

BRILLIANT AND STEADY ILLUMINATION.

Economical and Reliable in Operation.



Controlled by the

SAFETY CAR HEATING & LIGHTING COMPANY

160 Broadway, NEW YORK CITY

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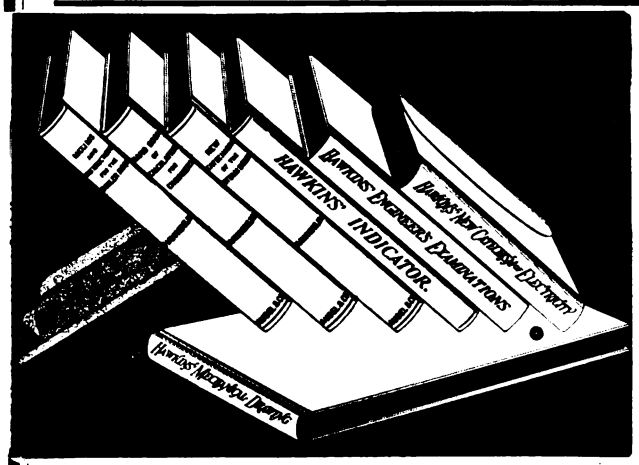

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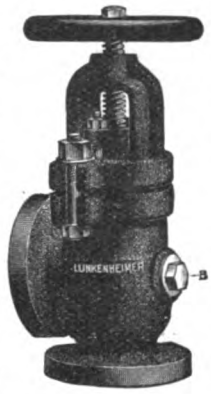

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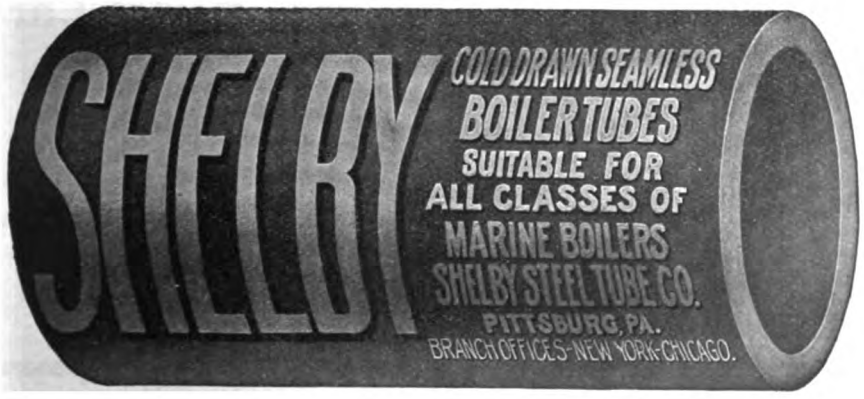

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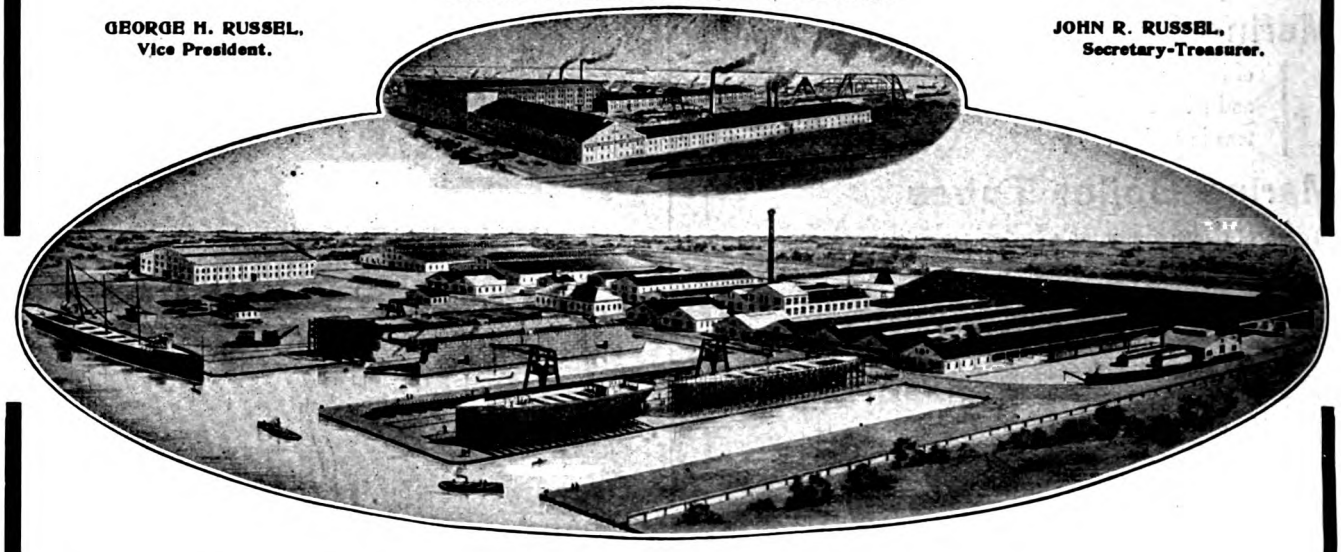

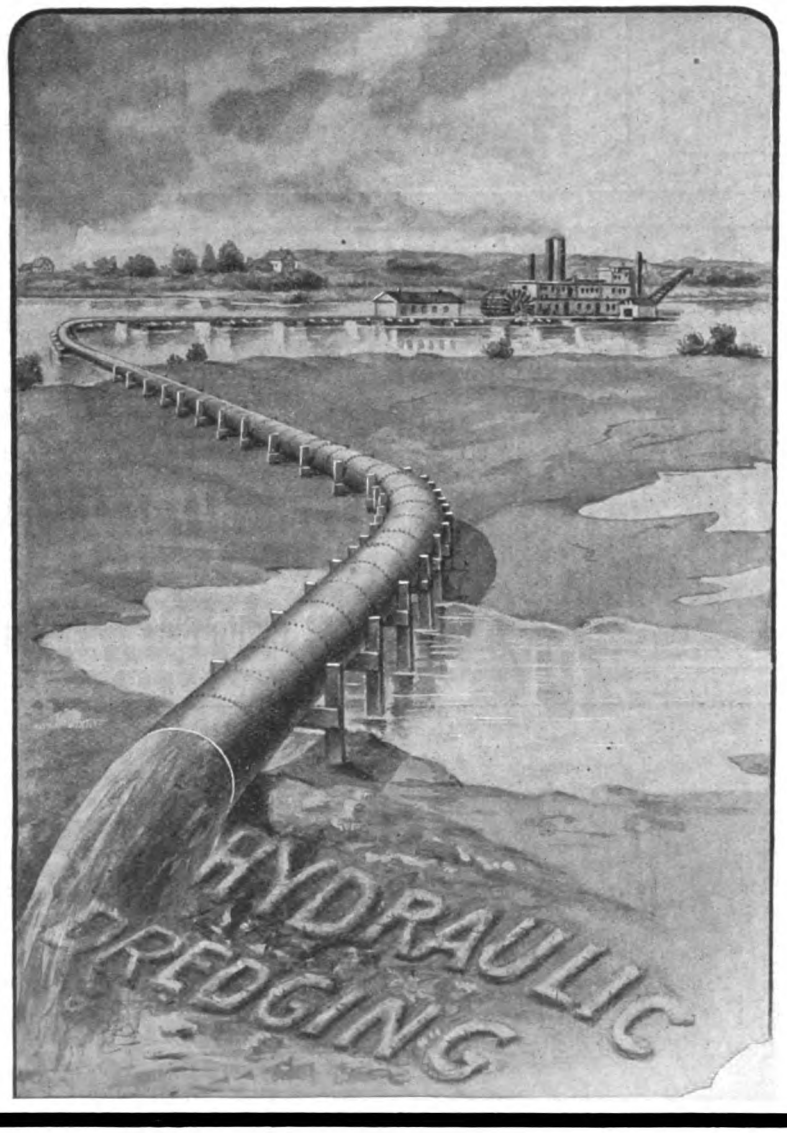

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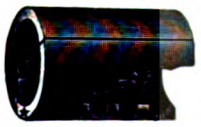

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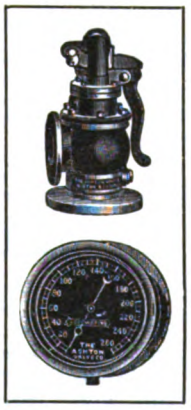

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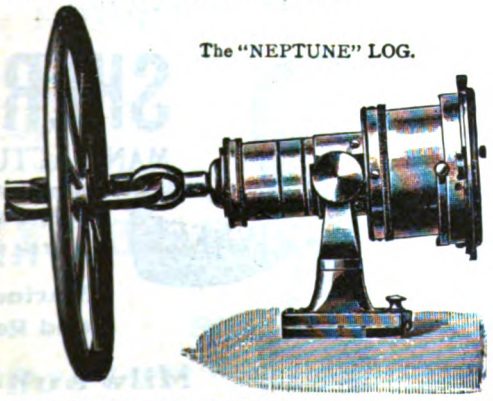

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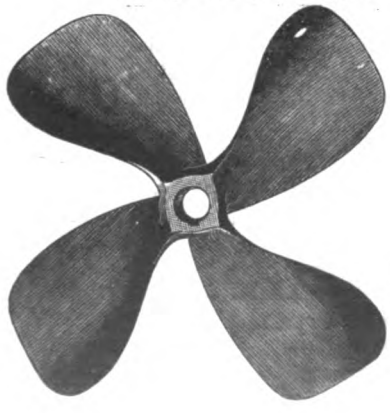

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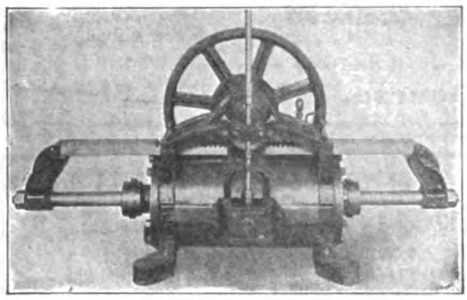

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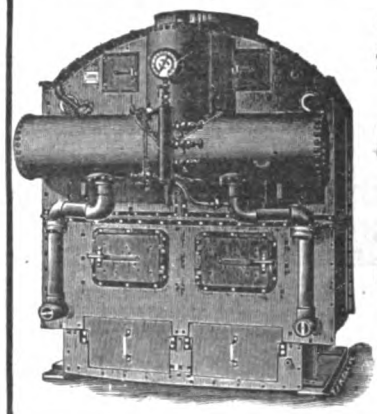

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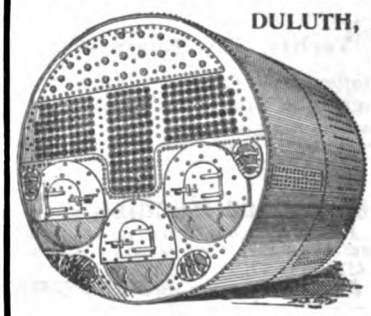

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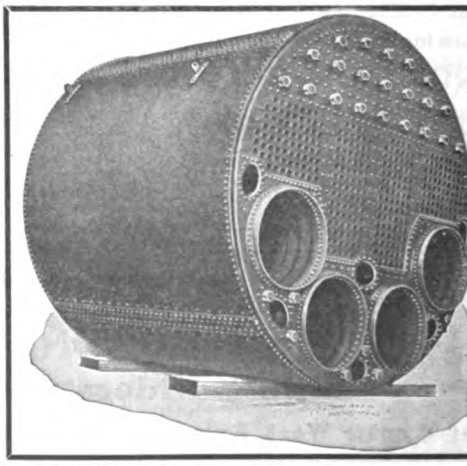

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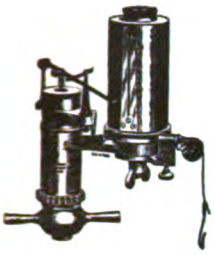

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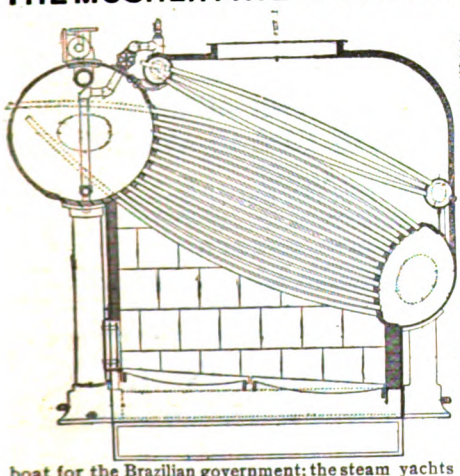

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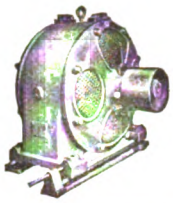

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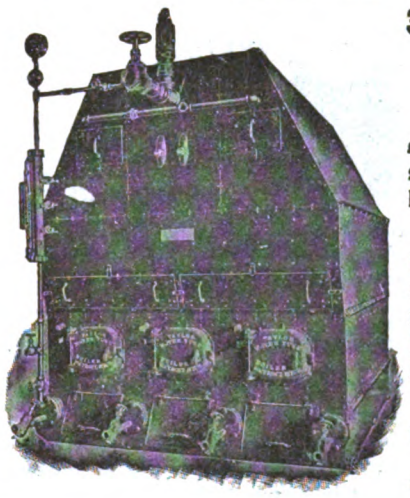

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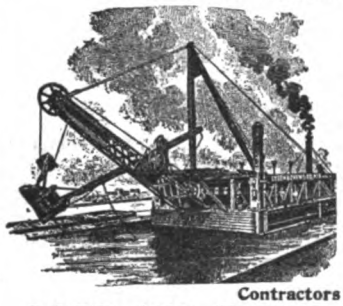

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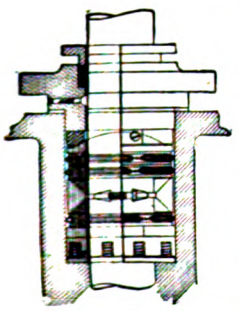

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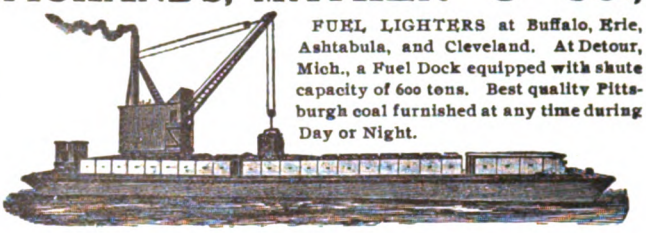

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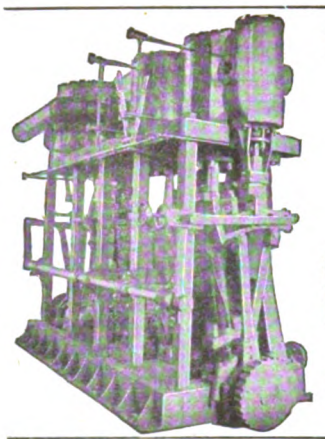

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.....Duluth, Minn.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.
Hynd, Alexander .....Cleveland.
Hunt, Robt. W. & Co.....Chicago.
Kidd, Joseph .....Duluth, Minn.
Kreer & Parsons.....Chicago.
Lovejoy, H. O.....Buffalo.
Matteson & Drake .....Philadelphia.
Mosher, Chas. D.....New York.
Nacey, James .....Cleveland.
Rice, Henry .....Buffalo.
Roelker, H. B.....New York.
Wood, W. J. .....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.
Sturtevant, B. F. Co.....Hyde Park, Mass.

FEED WATER PURIFIERS AND HEATERS.
Kelly Repair and Supply Co., Jas.....New York.
Ross Valve Co.....Troy, N. Y.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.....
.....Pittsburg, Pa.

FORGES.
Sturtevant, B. F. Co.....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.
Cleveland City Forge & Iron Co....Cleveland.
Fore River Shipbuilding Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.
Fix's, S. Sons .....Cleveland.

FUEL ECONOMIZERS.
Sturtevant Co., B. F.....Hyde Park, Mass.

FUELING COMPANIES AND COAL DEALERS.
Hanna, M. A. & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Picklands, Mather & Co.....Cleveland.
Pittsburg Coal Co.....Cleveland.
Smith, Stanley B., & Co.....Detroit,
Smith Coal & Dock Co., Stanley B.Toledo, O.

FURNACES FOR BOILERS.
Continental Iron Works.....New York.

GASKETS, RUBBER.
New York Belting & Packing Co..New York.

GAS BUOYS.
Safety Car Heating & Lighting Co..New York.

GAS AND GASOLINE ENGINES.
Chase Machine Co.....Cleveland.
Georgian Bay Engineering Works.....
..... Midland, Ont.
Reliance Mfg. Co.....Providence, R. I.

GAUGES, STEAM AND VACUUM.
American Steam Gauge & Valve Mfg. Co.
..... Boston.
Ashton Valve Co.....Boston.
Lunkenheimer Co. .....Cincinnati.

GAUGES, WATER.
Bonner & Co., Wm. T.....Boston.
Lunkenheimer Co. .....Cincinnati, O.

GRAPHITE.
Dixon Crucible Co., Joseph..Jersey City, N. J.

HAMMERS, STEAM.
Chase Machine Co.....Cleveland.

HATCH COVERS.
American Canvas & Tarpaulin Corp ....Buffalo.

HEATING APPARATUS.
Sturtevant, B. F. Co.....Hyde Park, Mass.

HOISTS FOR CARGO, ETC.
American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co. (Inc.)....
..... Cleveland.
Chase Machine Co.....Cleveland.
General Electric Co.....New York.
Georgian Bay Engineering Works.....
..... Midland, Ont.
Hyde Windlass Co.....Bath, Me.
McMyler Mfg. Co.....Cleveland.
Marine Iron Co.....Bay City.
Metz, Aug. .....New York.
Westinghouse Electric & Mfg. Co.....
.....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.
Falls Hollow Staybolt Co...Cuyahoga Falls, O.

HOSE, RUBBER.
New York Belting & Packing Co..New York.

HYDRAULIC DREDGES.
Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.
Watson-Stillman Co., The.....New York.

ICE MACHINERY.
Great Lakes Engineering Works.....Detroit.
Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.
American Steam Gauge Co.....Boston.
Ashton Valve Co.....Boston.

INJECTORS.
American Injector Co.....Detroit.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Lunkenheimer Co. .....Cincinnati.
Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.
Elphicke, C. W. & Co.....Chicago.
Fleming & Co., E. J.....Chicago.

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Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A.....Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Peck, Chas. E. & W. F..New York & Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.

IRON CASTINGS.
Reading Iron Co.....Reading, Pa.

IRON ORE AND PIG IRON.
Bourne-Fuller Co.....Cleveland, O.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co.....Cleveland.
Reading Iron Co.....Reading, Pa

LAMPS, INCANDESCENT.
Westinghouse Elec. & Mfg. Co.....Pittsburg, Pa.
Sawyer-Man Electric Co. .....Pittsburg, Pa.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.
Georgian Bay Engineering Works.....
..... Midland, Ont.
Marine Iron Works.....Chicago.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Willard, Chas. P.....Winthrop Harbor, Ill.

LIFE PRESERVERS, LIFE BOATS, BUOYS.
Armstrong, Cork Co.....Pittsburg.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, D. .....New York

LIGHTS, SIDE AND SIGNAL.
Russell & Watson .....Buffalo.

LOGS.
Walker & Sons, Thomas ....Birmingham, Eng.
Also Ship Chandlers.

LUBRICATING GRAPHITE.
Dixon Crucible Co., Joseph..Jersey City, N. J.

LUBRICATORS.
Crane Co. .....Chicago.
Lunkenheimer Co. .....Cincinnati.

LUMBER.
Martin-Barriss Co.....Cleveland.

MACHINISTS.
Chase Machine Co.....Cleveland.
Hickler Bros. .....Sault Ste. Marie, Mich.
Lockwood Mfg. Co.....East Boston, Mass.

MACHINE TOOLS (WOOD WORKING).
Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS.
Hickler Bros. .....Sault Ste. Marie, Mich.

MARINE RAILWAYS, BUILDERS OF.
Crandall & Son, H. I....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.
Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.
American Ship Building Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Great Lakes Engineering Works ..Detroit.
Sturtevant, B. F. Co.....Hyde Park, Mass.

METALLIC PACKING.
Katzenstein, L. & Co.....New York.

METAL POLISH.
Bertram's Oil Polish Co.....Boston

MOTORS, GENERATORS—ELECTRIC.
Fisher Electrical Works.....Detroit.
General Electric Co.....Schenectady, N. Y.
Sturtevant, B. F. Co.....Hyde Park, Mass.
Westinghouse Electric & Mfg. Co.....
..... Pittsburg, Pa.

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NAUTICAL INSTRUMENTS.
Ritchie, E. S., & Sons.....Brookline, Mass.

NAVAL ARCHITECTS.
Hynd, Alexander .....Cleveland.
Kidd, Joseph.....Duluth, Minn.
Kreer & Parsons. .....Chicago.
Lovejoy, H. O.....Buffalo.
Matteson & Drake.....Philadelphia.
Mosher, Chas. D.....New York.
Nacey, James .....Cleveland.
Rice, Henry .....Buffalo.
Wood, W. J.....Chicago.

OAKUM.
DeGrauw, Aymar & Co.....New York.
Stratford, Oakum Co.....Jersey City, N. J.

OIL ENGINES.
Mietz, Aug. .....New York.

OILS AND LUBRICANTS.
Dixon Crucible Co., Joseph..Jersey City, N. J.
Standard Oil Co.....Cleveland.

PACKING.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Katzenstein, L. & Co.....New York.
New York Belting & Packing Co...New York.

PACKING TOOL.
Matteson & Drake .....Philadelphia.

PAINTS.
Baker, Howard H. & Co.....Buffalo.
Carbolineum Wood Preserving Co....Milwaukee.
New Jersey Zinc Co.....New York.
Upson-Walton Co. .....Cleveland.

PATTERN SHOP MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PILE DRIVING AND SUBMARINE WORK.
Buffalo Dredging Co.....Buffalo.
Chicago & Gt. Lakes Dredge & Dock Co..
..... Chicago.
Dunbar & Sullivan Dredging Co.....Buffalo.
Fitz-Simons & Connell Co.....Chicago.
Hickler Bros. .....Sault Ste. Marie, Mich.
Lake Superior Contracting & Dredging Co.,
.....Duluth, Minn.
Parker Bros. Co., Ltd.....Detroit.
Smith Co., L. P. & J. A.....Cleveland.
Starke Dredge & Dock Co., C. H...Milwaukee.
Sullivan, M. .....Detroit.

PIPE, WROUGHT IRON.
Bourne-Fuller Co.....Cleveland, O.
Crane Co. .....Chicago.
Macbeth Iron Co.....Cleveland.
Reading Iron Co.....Reading, Pa.

PLANING MILL MACHINERY.
Atlantic Works, Inc.....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.
Bourne-Fuller Co.....Cleveland, O.
Otis Steel Co.....Cleveland.
Reading Iron Co .....Reading, Pa

PRESSURE REGULATORS.
Kieley & Mueller .....New York.
Ross Valve Co.....Troy, N. Y.

PROPELLER WHEELS.
American Ship Building Co.....Cleveland.
Atlantic Works .... East Boston, Mass.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co.....Detroit.
Fore River Shipbuilding Co.....Quincy, Mass.
Great Lakes Engineering Works.. Detroit.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Marine Iron Works ..... Chicago.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....
.....Newport News, Va.
Roelker, H. B.....New York.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co....Superior, Wis.
Thropp & Sons Co., J. E.....Trenton, N. J.
Trout, H. G.....Buffalo.

PROJECTORS, ELECTRIC.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.....
..... Pittsburg, Pa.

PUMPS FOR VARIOUS PURPOSES.
Blake, Geo. F., Mfg. Co.....New York.
Great Lakes Engineering Works Detroit.
Marine Iron Works ....Chicago.
Kingsford Foundry & Machine Works....
..... Oswego, N. Y.

REFRIGERATING APPARATUS.
Great Lakes Engineering Works.....Detroit.
Roelker, H. B. .....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes Register .....Cleveland.
Record of American & Foreign Shipping..
.....New York.

REPAIRS—ENGINE AND BOILER.
(See also Boiler Manufacturers and Engine Builders.)
Georgian Bay Engineering Works.....
.....Midland, Ont.

RIVETS, STEEL FOR SHIPS AND BOILERS.
Bourne-Fuller Co.....Cleveland, O.

SAFETY VALVES.
American Steam Gauge & Valve Mfg. Co.
..... Boston.
Ashton Valve Co.....Boston.
Crane Co. .....Chicago.
Lunkenheimer Co. .....Cincinnati.

SAIL MAKERS.
American Canvas & Tarpaulin Corp ....Buffalo.
Baker, Howard H. & Co.....Buffalo.
Upson-Walton Co.....Cleveland.

SALVAGE COMPANIES.
See Wrecking Companies.

SEARCH LIGHTS.
General Electric Co.....Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.....
.....Pittsburg, Pa.

SHEARS.
See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.
Bourne Fuller Co.....Cleveland, O.
Otis Steel Co.....Cleveland.
Reading Iron Co.....Reading, Pa.

SHIP BUILDERS.
American Ship Building Co.....Cleveland.
Atlantic Works .....East Boston, Mass.
Bertram Engine Works Co., Ltd.Toronto, Can.
Buffalo Dry Dock Co.....Buffalo.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co.....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Ship Building Co.....Detroit.
Fore River Shipbuilding Co .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Maryland Steel Co.....Sparrows Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Newport News Ship Building Co.....
.....Newport News, Va.
New York Shipbuilding Co.....Camden, N. J.
Roach's Ship Yard .....Chester, Pa.
Shipowner's Dry Dock Co.....Chicago.
Smith & Son, Abram.....Algonac, Mich.
Willard, Chas. P. & Co.Winthrop Harbor, Ill.

SHIP CHANDLERS.
American Canvas & Tarpaulin Corp ... Buffalo.
Baker, Howard H. & Co.. .....Buffalo.
Marine Mfg. & Supply Co.....New York.
Upson-Walton Co.....Cleveland.

SHIP DESIGNERS.
Kidd, Joseph.....Duluth.
Kreer & Parsons.....Chicago.
Matteson & Drake.....Buffalo.
Rice & Lovejoy.....Buffalo.
Steel, Nacey & Hynd.....Cleveland.
Wood, W. J.....Chicago.

SHIP LANTERNS AND LAMPS.
Russell & Watson .....Buffalo.

SHIP TIMBER.
Martin-Barriss Co.....Cleveland.

SMOOTH-ON COMPOUND, FOR REPAIRS.
Smooth-On Mfg. Co.....Jersey City, N. J.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co..Cuyahoga Falls, O.
Reading Iron Co.....Reading, Pa.

STEAM VESSELS FOR SALE.
Gilchrist & Co., C. P. .....Cleveland.
Holmes, Samuel .....New York.
Lester, S. S.....Quebec, Can.
McCarthy, T. R.....Montreal, Can.

STEAMSHIP LINES, PASS. AND FREIGHT.
American Line .....New York.
Anchor Line .....Buffalo.
Boston Steamship Co .....Boston.
International Mercantile Marine Co.....
..... Philadelphia.
New York & Cuba Mail S. S. Co.....New York.
Red Star Line .....New York.
United Fruit Co .....Boston.

STEEL CASTINGS.
Otis Steel Co.....Cleveland.

STEERING APPARATUS.
American Ship Building Co.....Cleveland.
Chase Machine Co.....Cleveland.
Detroit Ship Building Co.....Detroit.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co....Port Huron, Mich.
Marine Mfg. & Supply Co.....New York.
Moulton Steering Engine Co.....New York.
Sheriffs Mfg. Co.....Milwaukee.

SUBMARINE DIVING APPARATUS.
Morse & Son, A. J.....Boston.
Schrader's Son, A.....New York.

SURVEYORS, MARINE.
Gaskin, Edward .....Buffalo.
Hynd, Alexander .....Cleveland.
Lovejoy, H. O.....Buffalo.
Matteson & Drake .....Philadelphia.
Parker Bros. Co., Ltd.....Detroit.
Nacey, James .....Cleveland.
Rice, Henry .....Buffalo.
Steel, Adam .....Cleveland.
Wood, W. J.....Chicago.

TARPAULINS.
American Canvas & Tarpaulin Corp ....Buffalo.

TESTS OF MATERIALS.
Hunt, Robert W. & Co.....Chicago.
Lunkenheimer Co .....Cincinnati, O

TILING, INTERLOCKING RUBBER.
New York Belting & Packing Co...New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.
Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.
Atlantic Works, Inc.....Philadelphia.

TOWING MACHINES.
American Ship Windlass Co..Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.
Donnelly Salvage & Wrecking Co.....
.....Kingston, Ont.

TRAPS, STEAM.
Kieley & Mueller .....New York.
Sturtevant Co., B. F., ...Hyde Park, Mass.

TRUCKS.
Boston & Lockport Block Co.....Boston.

TUBING, SEAMLESS.
Shelby Steel Tube Co.....Pittsburg, Pa.

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VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge & Valve Mfg. Co. ..... Boston.
Ashton Valve Co. ..... Boston.
Crane Co. ..... Chicago.
Jenkins Bros. ..... New York.
Kieley & Mueller ..... New York.
Lunkenheimer Co. ..... Cincinnati.
Ross Valve Co. ..... Troy, N. Y.

VALVES FOR WATER AND GAS.

Lunkenheimer Co. ..... Cincinnati.
Ross Valve Co. ..... Troy, N. Y.

VARNISHES.

Detroit Varnish Co. ..... Detroit.
Detroit White Lead Works ..... Detroit.
New Jersey Zinc Co. ..... New York.
Also Ship Chandlers.

VENTILATING APPARATUS FOR SHIPS.

Sturtevant, B. F. Co. ..... Hyde Park, Mass.

VESSEL AND FREIGHT AGENTS.

Boland, John J. ..... Buffalo.
Brown & Co. ..... Buffalo.
Elphicke, C. W. & Co. ..... Chicago.
Fleming & Co., E. J. ..... Chicago.
Gilchrist & Co., C. P. ..... Cleveland.
Hall, John B ..... Buffalo.
Helm & Co., D. T. ..... Duluth.

VESSEL AND FREIGHT AGENTS—Con.

Hawgood & Co., W. A. ..... Cleveland.
Holmes, Samuel ..... New York.
Hutchinson & Co. ..... Cleveland.
Lester, S. S. ..... Quebec, Can.
McCarthy, T. R. ..... Montreal.
Mitchell & Co. ..... Cleveland.
Parker Bros. Co., Ltd. ..... Detroit.
Prindiville & Co. ..... Chicago.
Richardson, W. C. ..... Cleveland.
Sullivan, D. & Co. ..... Chicago.

WATER GAUGES.

Bonner & Co., Wm. T. ..... Boston
Lunkenheimer Co. ..... Cincinnati, O.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. ..... Buffalo.
DeGrauw, Aymar & Co. ..... New York.
Upson-Walton Co. ..... Cleveland.

WHISTLES, STEAM.

American Steam Gauge & Valve Mfg. Co. ..... Boston.
Ashton Valve Co. ..... Boston.
Lunkenheimer Co. ..... Cincinnati.

WINDLASSES.

American Ship Windlass Co. ..... Providence, R. I.
American Ship Building Co. ..... Cleveland.
Hyde Windlass Co. ..... Bath, Me.
Jenks Ship Building Co. ..... Port Huron, Mich.
Marine Mfg. & Supply Co. ..... New York.

WINCHES.

American Ship Windlass Co. ..... Providence, R. I.
Georgian Bay Engineering Works ..... Midland, Ont.
Hyde Windlass Co. ..... Bath, Me.

WOOD PRESERVING PAINT.

Carbolineum Wood Preserving Co. ..... Milwaukee.

WOOD WORKING MACHINERY.

Atlantic Works, Inc. ..... Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. ..... Kingston, Ont.
Parker Bros. Co., Ltd. ..... Detroit.

YACHT AND BOAT BUILDERS.

Bertram Engine Works Co., Ltd. ..... Toronto, Can.
Drein, Thos. & Son ..... Wilmington, Del.
Georgian Bay Engineering Works ..... Midland, Ont.
Truscott Boat Mfg. Co. ..... St. Joseph, Mich.
Willard, Chas. P. & Co ..... Winthrop Harbor, Ill.

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Drein, Thos. & Son ..... Wilmington, Del.

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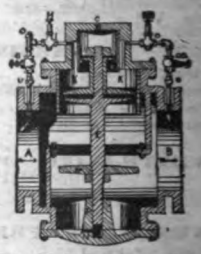

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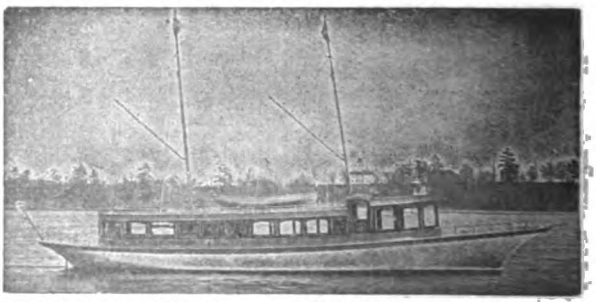

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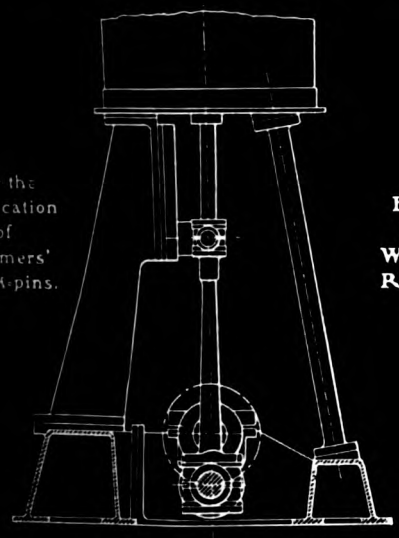

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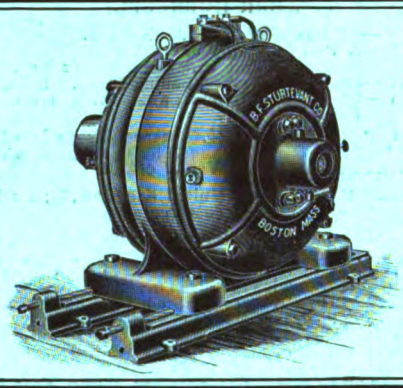

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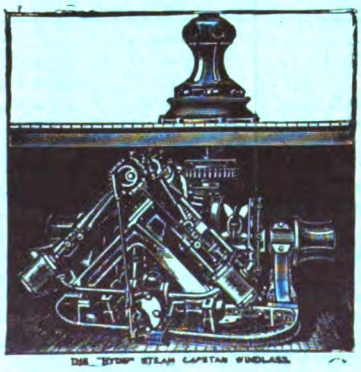

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